THE

ECLECTIC REPERTORY

AND

ANALYTICAL REVIEW.

VOL. III. OCTOBER, 1812. No. I.

SELECTED PAPERS.

Of the Soil and general state of Health, in different parts of North Carolina.

THE following extract from "The History of North Carolina, by Hugh Williamson, M.D. LL.D. Member of the Holland Society of Sciences, of the Society of Arts and Sciences of Utrecht, of the American Philosophical Society, &c. in two volumes," recently published by Thomas Dobson, Philadelphia, will be read with interest, and we hope may excite some of our medical brethren to give us similar accounts of the respective states in which they reside.

"The climate of North Carolina is usually thought to be unhealthy; but this character is not applicable, except to the eastern part of the state; the part that is best known to strangers, and most frequented, because it is intersected by navigable rivers, and is the general seat of commerce. Other parts of the state are exceedingly healthy. By taking a short view of the face of the country, we shall immediately perceive the cause of this remarkable difference.

Carolina is a perfect plain for sixty miles from the Atlantic ocean, without hills or stones. It has been covered by water, at no great distance of time. Beds of oyster shells and other marine exuviæ, are found near the surface, in many parts of the

flat country. Those concretions of shells are burnt for making lime. The gulf stream runs along the coast, within six or seven leagues of the shore. The soundings change suddenly at the edge of the gulf stream, for the margin is nearly a perpendicular bank. A great fissure, nearly in the direction of northeast and southwest, has been made in the bottom of the ocean, by some convulsion of nature.* Such at least appears to have been

* The lacerated and irregular state of the different strata that are found to the eastward of the Appalachian mountains, is in proof that earthquakes or volcanic eruptions have been frequent there. The strata of limestone, for instance, are observed, in every case, to dip or make an angle of thirty-five to forty-five degrees with the plane of the horizon. In the western country, the case is different. The strata in those regions, are generally unbroken, and they lie parallel to the plane of the horizon. Hence it is, that rivers in the western country are observed to increase more by a moderate fall of rain, than on the hither side of the mountains: the greater part of the rain is there prevented, by the unbroken strata, from sinking into the earth. It seems probable, that the abundance of salt springs that are found on the western side of the mountains, is also to be accounted for by keeping in mind the cause of this remarkable difference in the texture of the earth.

A small explosion of a volcanic nature, was observed about the year 1793, in Anson county.

In the year 1794, a remarkable subterranean wall was discovered, about twelve miles from Salisbury, in Rowan county. This wall is nearly parallel to a small rivulet, at the distance of thirty or forty feet, from which the ground rises on both sides by a moderate slope. There is a clear field adjoining the rivulet, and the water that ran across the field in heavy rains, caused a gully, by which the top of the wall was exposed to view. People have traced the wall about three hundred feet. It is twenty-two inches thick, and the top of it is, in most places, from two to six feet below the surface of the ground. But as the ground rises considerably in one place, the wall rises at the same place, so that one part of it is fifteen or twenty feet above the level of another part. It is perfectly straight, except that in one place there is a circular offset of about six feet; after which, it is continued in its former direction. Some people have dug ten or twelve feet by the side of the wall, without finding its bottom, or any alteration in its form. The stones of which it is composed, are all of one kind, of a dark colour, containing iron. They are fusible without addition. In the formation of this wall, there are not any large stones. Few of them weigh so much as twelve pounds. The outside stones are mostly of an oblong figure; seven or eight inches in length. In all cases they lie across the wall. The inside of the wall is composed of stones of every shape. All the stones seem to be bedded in mortar; and the outside stones, that are flattish, are laid upon one another with much apparent care. When they do not exactly fit, there seems to be a small fragment of a stone wedged in, so as to fill the space. The mortar resembles putty

the case. The ground rose to the northwestward of the chasm, and sunk to the southeastward. The sandy bottom of the sea, by this elevation to the westward, was converted into dry land. In this case, the rivers coming down from the original dry land, made a crooked path for themselves through the sandy plain. Those rivers had little descent; wherefore, in their tardy course, they deposited the vegetable mould that came down from the higher grounds. In some cases, the sandy plain had been depressed five or six feet below the level of the common surface. In those parts, it must have happened that ponds of stagnant water were formed, until the sunken ground was filled up by vegetable mould. By this hypothesis we are enabled to explain all the present phenomena of the flat country. In some parts we find large sandy tracts, perfectly level, that hardly contain

to the touch, having no mixture of sand. In some places the mortar is found to be an inch thick, where the stones do not exactly fit one another. The wall seems to be plastered on both sides with the same kind of mortar. The earth on both sides of the wall seems to be factitious, being composed of sand and pebbles. It becomes harder the further down they dig.

Is this wall natural or artificial? Some gentlemen presume that it is a basaltic eruption, and their opinion is founded on the quality of the stones, and on the circumstance of its being a great work of no use. But if it is basaltic, it differs from every thing of the kind we have seen recorded. Instead of perpendicular columns, as in the Giant's Causeway, and many other productions of the kind, it chiefly consists of flat stones parallel to the horizon. Instead of parts that fit one another exactly, with a simple intervening crack, here are pieces that seldom fit, the intervening space being filled up by a soft substance. The thickness of that cement does not suffer us to call it a rust, although from its chemical qualities it might pass for a spontaneous decomposition of the stones. The uniform thickness of the wall has also been deemed unfavorable to the idea of its being the work of nature. But we gain little in shunning a difficulty, when we allege that the wall is the work of art. To suppose that any body of men performed a toilsome and difficult work, that could be of no possible use, would be to charge them with pure madness. And the folly of building a naked straight wall, in a low piece of uneven ground, seems to beggar description. A lesser wall has since been discovered, at the distance of five or six miles. It has been traced fifty or sixty feet. It is only seven inches thick, and all the stones reach quite across the wall. Those walls are probably of the same date.

We are not allowed to deny the existence of those walls, although we find some difficulty in accounting for some of the present phenomena. But the use of Stonehenge in Salisbury is luminous, compared to the Salisbury walls when they are ranked among the works of art.

any mixture of clay or vegetable soil. The growth is pine or black jack. In other parts the land is of an excellent quality, with a stiff clay bottom. Those lands are low; and in many places they require draining. The rivers are bordered by a strip of land that is lower than the common surface of the country. Those river lands are exceedingly rich; for they consist of vegetable mould, three or four feet deep, with a small mixture of sand or clay. In many places those river lands are three or four times the breadth of the river. There are other large tracts detached from the rivers in which the soil is nearly of the same quality with that of the river lands. But it is seldom mixed with sand or clay. In those tracts the vegetable soil is commonly five or six feet deep, and the whole of it is saturated with water. Such are the Dismals, so called, and the other great swamps that are numerous in the flat country. Supposing as above, that the original surface, where the swamps are found, had been covered for many years with stagnant water, because it was somewhat depressed, it would follow, that the chief rivers at every great fall of rain, must have thrown part of their turbid stream into those stagnant ponds, until they were so filled with adventitious soil, as to produce reeds and other aquatic plants. The luxuriant growth in those swamps, in the progress of time, caused the surface to rise; so that in many cases it is higher than the adjacent sandy and dry plain. Some of those swamps are fifteen or twenty miles in diameter, and they are chiefly covered, at present, with a thick growth of cypress* or juniper.† In some parts they are covered with maple,‡ poplar,§ and white oak,‖ intermixed with tall reeds, magnolia,¶ and green briars.

The soil increases every year by the addition of decayed vegetables; but the water is detained by the leaves and the roots of trees, so as to have little motion, though the surface has become much higher than the water in the adjacent rivers.

* Cupressus disticha, foliis disticis patentibus.

† Cupressus tryoides, foliis imbricatis frondibus ancipitibus.

‡ Acer rubrum.

§ Arbor tulipifera Virginiana.

‖ Quercus alba Virginiana.

¶ Magnolia glauca, foliis oblato oblongis, subtus glaucis.

Some years ago, Mr. Josiah Collins of Edenton, and one or two other gentlemen, projected a canal, about five miles long, through a swamp of this kind, in Tyrrel county, that was chiefly covered with stagnant water. Their original object was to drain a lake that is eight or nine miles long, and nearly of the same breadth. Upon making a survey, it appeared that the water in the lake was three feet higher than the richest part of the swamp, and the surface of that swamp was seven feet higher than the water in the nearest river. By that survey it was discovered that they were in possession of an excellent rice swamp; above ten thousand acres in one body, that may be covered at pleasure with fresh water, eighteen inches or two feet deep. By finishing the canal, and erecting three or four mills, that are turned by the waters of the lake, and by raising a few crops of rice and wheat, they have shown that lands, formerly of little value, may be made the most profitable lands in the state. The rice produced on those lands is not exceeded in quality by any rice in Georgia or South Carolina. Mr. Collins, to vary the crop, has occasionally sown part of those lands with wheat, and they produce thirty-four to thirty-five bushels per acre.

In digging the canal from the lake to the river, many large trees were found in a state of good preservation, though they had been covered, four or five feet deep by vegetable soil. A clear indication of the manner in which the soil has been formed.

It is conjectured that the swamps, within forty miles of the coast, do not occupy less than a fifth part of the surface. It will readily be perceived, that so large a quantity of stagnant water among putrescent vegetables, must be unfriendly to the health of the inhabitants. Intermitting fevers are very frequent in the summer and autumn; but fevers with inflammatory symptoms, that have a putrid tendency, prevail in the winter. The progress of time and cultivation of the soil, cannot fail to make a considerable change in the climate, in the flat lands of Carolina. And the effect of that change must be favourable to the health of the inhabitants. The natural operations of time would reduce those extensive and numerous swamps, to the condition of firm and dry land; but this event must be greatly accelerated by the progress of cultivation. The subsidence of water is very observable, in many parts along our coast. Where

the lands are high, this circumstance has been little observed; but in flat countries, where the water is troublesome, it claims more attention. There are considerable tracts, now planted with corn, that, in the beginning of the eighteenth century, were covered by water. This was not the effect of drains or ditches; it was caused by the waters sinking in the adjacent rivers or sounds. There are two causes that equally contribute to the failure of water in the low country;—the cultivation of the interior lands, and the regular subsidence of water in the ocean. Most of the large rivers in Carolina discharge themselves into a sound, that communicates with the Atlantic by small inlets. The water in the sound is nearly fresh; it is perfectly fresh in the rivers. These rivers have no tide, and they have little motion through the whole of the flat country. The waters are observed to swell in the rivers and in the sound by a heavy fall of rain. From this circumstance we infer, that every decrease of rain will be attended by a decrease of water in the rivers, and by a consequent decrease of water in the sound. The general decrease of rain is easily accounted for by the progress of cultivation. We account, in the same manner, for the decrease of fresh water in all our rivers. As the waters decrease or sink, the lands appear to rise, and the marshes, that communicate with the rivers, become dry land; except in cases where a level surface and thick growth prevent the rain-water from running off. The decrease of the rivers, from this cause alone, with the aid of ditching and draining, would soon reduce all the great swamps to the condition of arable land. But there is another cause that co-operates with the decrease of river water. The waters on the coast are supposed to sink. We have no solid marks on our coast, by which we can estimate the accidents of ocean water; but we allege the general subsidence of the ocean here, from what is observed in other countries. The inhabitants of West Bothnia have observed, by marks on the rocks, that the sea decreases four inches five lines every ten years, or forty four inches and two lines every century. Dalen calculates, that the waters in Sweden sink thirty-seven inches in one hundred years. Ravenna, in Italy, is no longer a sea-port. There seems to be good evi-

dence, that a direct communication by water formerly existed between the Baltic and the Euxine or Black Sea.

Herodotus alleges, that great part of Poland and Russia had been covered by water. And Orpheus, in his Argonauts, supposes that one might sail from the Euxine to the Baltic. There must have been a tradition, that such a passage had formerly been effected. Ptolemy speaks of Scandinavia as an island. Homer describes the island of Pharos as a day's sail from Egypt; and we know, that the present city of Alexandria is built on the very spot that was the original harbor of the old city. This remarkable subsidence of the ocean has been accounted for by different theories; none of them, as I think, satisfactory. It is not to be supposed that the bed of the ocean is deepened by the attrition of the water; for more earth or clay is doubtless brought into the ocean by rivers, than is taken out of it by other means.

There may be caverns in the earth by which water is occasionally absorbed. Islands have been raised in the ocean by the help of subterranean fire. A small one has lately been added to the Azores; but the space, they formerly occupied, does not contain much water. When we consider the numerous and frequent volcanic eruptions that have appeared in the great chain of islands that extend through the Pacific ocean, near the equator; the numerous eruptions that have appeared in the Cordillera of the Andes; and the constant flames that appeared in Greenland and other high latitudes, giving light and heat to those frozen regions; we must suppose that the earth abounds in caverns whereby water has been absorbed. But we are also to consider that dry land has disappeared or sunk in different parts of the world; and the absorption of water by volcanic eruptions is neither great nor regular.

There is another process by which, as I conceive, the decrease of water may be accounted for. It is the regular and constant conversion of water into shells, madrepores, and corals. Fixable air abounds in water, by means of which it unites with calcareous bodies. Corals and other substances, formed by this union, are specifically heavier than water, nearly as two and a half to one.

We do not pretend to know, by what process certain animals

or insects in the ocean cause the formation of shells, madrepores and corals from water, or from earth and air that are attached to water and seem to be part of that fluid; for they increase its bulk; but the process is constant. The shells that appear in shallow water, on our coast, are of little importance; but the madrepores and corals, formed in the ocean, are of prodigious magnitude. We are told, by late navigators, that in some parts of the South Sea navigation is become dangerous; and in other parts it is absolutely impracticable, by the formation of great ledges of madrepores or corals, where the water had been very deep. When we consider that more than two inches of water are required to form one inch of those weighty substances, we shall discover a probable cause for the subsidence of ocean water. Whatever the case may be, it can hardly be doubted, that the ocean is retiring from the land, or decreasing in depth. Nor is it to be doubted, that the quantity of water discharged by the rivers in Carolina, and in every new country, is decreasing every year. It must inevitably follow, from one or both of these causes, that the marshes or swamps in Carolina will soon disappear. The progress of agriculture is a steady auxiliary to the operations of nature in producing this desirable change. It is already discovered, as we have seen, that marshes are drainable; and the soil, when fitted to the plough, is excellent in quality. In process of time all those swamps will be cultivated.

Intermitting fevers are the usual complaints in the eastern part of Carolina. Those fevers seem to arise, as we have already observed, from the exhalations of stagnant water or putrid vegetables. They prevail more or less, according to the quantity of water that is exhaled, impregnated with putrescent vegetables. All our observations tend to confirm this opinion. When stagnant water is not exhaled, intermitting fevers are less prevalent. When putrescent vegetables are exposed to the action of the sun, intermittents are frequent. In the midst of great forests, the sun never visits the surface; his rays being fully intercepted by a thick growth of cypress, juniper, magnolia, and reeds. Intermitting fevers do not prevail in such places. Families who live in the Dismals, employed in making shingles, without a perch of clear or dry ground, enjoy more

health than people who live on their new plantations, near the rivers or swamps. The bad effect of recent cultivation, by which decaying vegetables are exposed to the sun, is severely felt in flat countries and warm climates. Carolina was less sickly before the country was opened. The second colony of adventurers remained twelve months in the country, and they lost only five men out of one hundred and seven, though they were badly sheltered, and suffered much by the scarcity of provisions. A gentleman in Craven county lived on his farm above forty years, without suffering by intermitting fevers, though his family consisted of fifty or sixty persons. There were about one hundred acres of clear ground in front of his house that had been cultivated many years: but there was a thick wood behind the house. In the beginning of the year 1785 he caused all the timber and shrubs that were behind his house, within four or five hundred yards, to be cut down. His object was pasture and a free circulation of air. One third of his family, on the next summer, was taken down by intermitting fevers. Such complaints were not more prevalent than usual, during that summer, in other parts of the flat country. Those fevers were certainly caused by exposing to the sun a large surface of fresh land, covered with putrescent vegetables. Similar effects are very common in the West Indies, where they are fatal to such a degree, that soil, newly turned up, is supposed by the planters to contain some pestilential quality.* Putrid exhalations are the general cause of hose bilious intermittents; but in tropical climates, where the sun is vertical, and the tendency to putrefaction great, and where the influence of heat on

* We wish to call the attention of cultivators to this important fact.—The danger from newly cleared ground is much increased, if the common summer and autumnal winds, the southwest, blow over them, in a direction towards the mansion house. A confirmation of the truth of this observation, occurred last summer at Colonel Joshua Howell's, in New Jersey, within eight miles of Philadelphia. A thick piece of wood to the southwest of the house, was cut down in the spring. This wood also served as a barrier between the house and a large extent of marsh, a quarter of a mile distant. About the middle of August, the whole family was attacked with severe remittent fevers, of which three died, and eight or ten more recovered, under the early use of blistering, and powerful exhibition of wine, Peruvian bark, and serpentaria.—*Ed. Elec. Rep.*

the living body increases the malignancy of the complaint, those fevers become most fatal. The simple intermitting fever that prevails during the summer season, in Carolina, is seldom fatal to the natives, except in cases where the frequent recurrence of such fevers may occasion an indurated spleen and other visceral obstructions. The consequence of such obstructions is a dropsy or other cachectical complaint, of which the patient dies. Fevers of the warm season sometimes become dangerous, especially to strangers, by the imprudent conduct of the patient. Upon the approach of febrile symptoms, strangers are apt, as they express themselves, to brave the fever. In this case, by taking exercise, increasing the muscular motion, and not unfrequently by the use of ardent spirits, or other stimulating drinks, they bring on a typhus or other constant fever, instead of a simple intermittent. A warm season, followed by a considerable drought, often produces an endemical flux or dysentery. Those complaints are doubtless of the putrid kind, and should be treated accordingly.

People on the low grounds of Carolina, are frequently attacked by fevers in the winter, which are called inflammatory; for they are attended by pain in some part of the head or the breast. These fevers, in many cases, prove fatal in three or four days. By the general symptoms, compared with the circumstances and places in which those fevers prevail, they seem to be of the putrid kind. They prevail in districts that are subject to intermitting fevers; whence they may be presumed to arise, in some measure, from the same cause; but they prevail in a different season of the year; whence it may be inferred, that there is a combination of causes in one fever that does not occur in the other. It has already been observed, that intermitting fevers are more or less frequent in the low lands of Carolina, according to the quantity of putrescent vegetable substance that is exposed to the action of the sun. From this circumstance it is conjectured, that the most simple species of intermitting fevers are, in some measure, the effect of putrefaction; but the most dangerous putrid fevers arise from the same cause. The difference then between the appearance or the effects of those fevers must depend on the state of the solids or the fluids of the person affected, or upon the acrimony

or virulence which the putrescent matter may have acquired before it is absorbed. The appearance of those fevers in the summer, when putrescent matter is plentifully diluted by rain, seems to be determined, in some measure, by the constitutions of the several patients. Strangers, from a northern climate, who have a vigorous constitution, whose muscular system is well braced, instead of having a moderate fever, in the summer or autumn, that will duly intermit after the first or second day, in many cases have an ardent fever, with full pulse. Instead of intermitting, it puts on the appearance of a typhus, or a nervous fever, in a few days, and terminates fatally. The same cause should produce the same effect upon similar bodies; but the effects upon the native and stranger are not alike; hence we infer, that a tense fibre or vigorous constitution, which naturally excites more heat, or causes the fever to be more ardent, produces, at the same time, a different and dangerous type. According to this theory, we observe, that by taking violent exercise, when the symptoms of an intermitting fever are coming on, the fever becomes ardent, and in many cases it is attended with danger. From these facts it would appear, that the affecting cause remaining the same, the fever is more or less dangerous according to the constitution of the patient, or any other circumstance that tends more or less to brace the system, or produce symptoms of inflammation.*

Though the fevers that appear in winter, are not usually called intermittents, they are not less effected by putrescent vegetable matter than the autumnal fevers. Those winter fevers have been deemed inflammatory, because they are usually attended by a pain in the head, or by a pain in the breast, that resembles pleurisy. They prevail not only in the same districts in which intermittents are common, but they are most likely to attack people who, on the preceding autumn, had suffered by

* A young man, near Pasquotank, heated himself by dancing, after he had been affected some hours by a slight pain in the brow. This happened in the winter season, during the prevalence of a complaint, that is called, however improperly, "a pleurisy in the head." He died within two days. This disease having obtained the name of an inflammatory fever, is usually treated like such complaints, by copious blood-letting. Though the patients, most of them, die, the lancet continues to be used with too much freedom; be-

intermitting fevers. These circumstances make it probable, but there are other circumstances from which it is certain, that the fevers to which I refer arise from a septic cause. In different years they prevail in different neighborhoods, affecting one or more persons in every family. When this disease is most prevalent, it may generally be traced to the vicinity of a marsh or the bed of a river, where mud or other putrescent vegetable substance has been exposed to the sun, in dry weather. The effects of dry weather on similar grounds, in the summer season, are frequently a flux or dysentery, which is also of the putrid kind. If the same cause, that would produce a simple intermittent, may also be found to produce an ardent fever, tending to putrefaction, by the sole concurrence of muscular motion, or the direct operation of the sun, whereby heat is excited, we are to presume that winter colds would produce remarkable effects on the appearance of that fever. The common effect of cold is to brace the solids and check the perspiration. In the case before us, the perspiration being obstructed, the offending matter, that has been absorbed, is retained in the system and gives a septic disposition to the fluids, by the increased action of the muscles.* It is generally observed that men suffer more than women or children by this disease. In

cause it seems to give temporary relief, and it can be used by men who have never taken the trouble to learn the nature of the disease, nor its proper remedy.

* It has been alleged, that the endemic fevers of summer and winter are equally caused by the absorption of putrid matter into the system. In support of this opinion we observe, that being exposed to a heavy shower in summer or autumn, in warm climates, is usually followed by intermitting fevers; but people at sea, in the same latitude and season of the year, expose themselves to showers without danger, because the atmosphere, at sea, s not charged with putrescent exhalations. It may also be observed, that people who use unguents, in warm climates, are less endangered by those fevers. Black people and white people, who have a copious perspiration, are also less subject to those complaints. Cold evenings in the autumn, and rain, by shutting the pores of the skin, are known to be the cause of innumerable fevers. While the perspiration is free, the putrid matter, that may be taken in by the absorbing vessels, is immediately discharged from the system; but in the case of obstructed perspiration, it is retained among the circulating fluids and becomes the seed of mortal disease. In cold weather, the complaint is usually thrown upon the head or breast.

the months of December and January 1794, 5, eight or nine men, the heads of families, who lived near the river Neus, were taken off by a fever such as I have mentioned; but no other people in that vicinity suffered by the disease. Some cause must have existed for this remarkable difference. The complaints of those men were not produced by intemperance alone; for though ardent spirits injure the system not only by destroying the powers of the solids, but also by vitiating the fluids, whence they bring on death in various forms, some of the men who fell under that bilious pleurisy, were not intemperate. In this case the disease seems to have arisen from obstructed perspiration. It cannot escape notice that men in Carolina are chiefly exposed to complaints which arise from that source. The temperature of the weather, in the eastern part of the state, is very changeable. When the wind is at northwest, there is occasional hard frost; but the weather, at other times is moderate and soft. As there are not many cold days, nor many days in which flannels or thick woollen garments are necessary, people fit their dress for the temperate weather, and not for the few days of incidental cold. They do not consider that warm clothes may be worn in temperate weather without danger; but thin clothes, in cold weather, expose the wearer to mortal disease. Women and children are not only more temperate than men, but they are usually at home; and they can increase their clothes upon a sudden approach of cold, or they can sit by the fire. Men are frequently surprised by rain or sudden cold, when they are abroad, and are not provided with a suitable dress. Prudence is the child of experience, but heedless men are seldom taught by the experience of other people. Personal experience in this as in many other cases, frequently comes too late. When the planters, they especially who have been visited by intermitting fevers during the summer or autumn, and those who live in the flat country, shall have the prudence to keep themselves dry, and shall be provided, in all their excursions, during the winter, with clothing fitted to cold weather;* when

* Such is the commendable industry of women in Carolina, that two thirds of the inhabitants are clothed in cotton that is raised, spun, and woven by themselves. This is an excellent dress for warm or temperate weather; but a garment of soft wool to be worn next the skin, is greatly to be preferre

they shall exchange the use of grog and ardent spirits for beer well seasoned with hops, or water that is less dangerous than either, we may be assured that many useful lives will be saved to the community.

When the country shall be sufficiently cleared, and the lands perfectly drained, there is much reason to believe, that people near the seacoast will enjoy a desirable state of health through the latter part of the summer, which is now called the sickly season.† The weather will also be less variable during the winter season, for reasons that have been stated; and a free circulation of air will diminish the summer's heat.

There are not many countries, in which the state of health differs so much as it does at present in the different parts of North Carolina. At the distance of sixty or seventy miles from the coast the land begins to rise into small hills, stones appear on the surface, and the streams ripple in their course. As we advance a little further to the westward, we find all the variety of hills and dales that may consist with a fertile country, fit for cultivation. In that happy climate where the soil is good, and the water pure; where the inhabitants enjoy the desirable effects of winter, without suffering by the rigorous severity of cold; there are few of the diseases which are most painful and destructive in cold climates: neither are the inhabitants wasted by the more fatal diseases of warm climates. There are not many parts in the United States, perhaps there is not any part of the world, in which families increase faster than in the western part of Carolina. When we consider, that the inhabitants are seldom affected by coughs, consumptions, or inflammatory complaints, for the winters are temperate; that intermitting, bilious, or putrid fevers are seldom found among them; we naturally infer, that the climate must be healthy. It is not denied, that people, in many other climates or countries, are equally healthy with those in the western part of Carolina; but the winters in

by valetudinarians. It is found that sheep thrive very well in Carolina, and their wool is good in quality. Planters, such of them especially as are invalids, and they who live in sickly districts, should never go abroad in the winter season, without a flannel waistcoat under the shirt, and a substantial greatcoat to be worn in case of a sudden change of weather.

† Instances of longevity are not wanting in Carolina in the flat country.

other regions, that are deemed healthy, are more severe, or the land is less fertile, or it is not so cheap, or the means of supporting a family, from one cause and another, are more difficult than in Carolina; whence it follows, that early marriages are not so frequent, and the increase of families is not so great. We have not the means of comparing the increase of people in Carolina with that in foreign countries, but it has been compared with the increase in other states. It appears by the census taken in the year 1791, that the number of inhabitants above sixteen years old, exceeded the number under sixteen in all the northern and middle states, including Maryland. In the southern states there was a difference in favour of those under sixteen, and this difference was greater in North Carolina than in any other state, except Kentucky. This difference might be explained by supposing that the duration of human life is shorter in the southern states, and that sixteen years is nearer the middle of the general extent; but this solution cannot be admitted, because in the most healthy parts of the southern states the difference was greatest in favour of the class under sixteen. The greater proportion of people below sixteen must be the combined effect of early marriage and a good climate. Families are easily supported where the lands are good, and the winters mild. In this case people marry young, and have many children: but early marriage alone will not produce a great proportion of children when compared to that of grown persons, because sickly climates are not less fatal to infants than to those who are more advanced in years. This distinction is fully supported by the census in North Carolina. The number of males in the whole state, below sixteen, was to that above sixteen, nearly as eleven to ten; but this difference cannot be the effect of early marriage alone, or the facility of maintaining a family; it depends very much on the salubrity of the climate. People live in the district of Edenton with more ease than in the district of Salisbury; for their cattle require less feeding in winter,* and they have a plentiful supply of fish; but the

* The flat lands near the coast, except such of them as are composed of sand, are generally covered by a thick growth of canes. The leaves of this plant are green all winter. They are long and succulent, and cattle in general are greatly attached to them.

proportion of persons under sixteen, was to that above sixteen, in Salisbury district, compared to that in Edenton district, nearly as three to one. In Salisbury district there were fifteen thousand eight hundred and twenty-six males under sixteen, and thirteen thousand nine hundred and eight above sixteen. The difference is nearly equal to a seventh part of the whole number of the older class. In Edenton district, the number of males under sixteen, was eight thousand six hundred and ninety-six, and the number above sixteen, was eight thousand three hundred and ninety-four: the difference being less than a twenty-seventh part of the number of the older class. This remarkable excess, in favour of Salisbury district, can only be explained by the greater salubrity of the climate. There are some very old people in the western parts of Carolina, but they were not born in that country; they are older than the settlement. After the country shall have been planted two or three centuries, and the natives shall have attained the length of years that corresponds with the climate, a greater proportion of the inhabitants above sixteen years will doubtless be found."

Practical Remarks on the Trembling occasioned by Mercurial Vapours. By M. Burdin, Jun. M. D. *From the Journal General de Médecine*, 1811.

[From the New Medical and Physical Journal for November, 1811.]

Among the numerous affections to which the muscular system is liable, and which show themselves in such various ways from the tetanus to complete paralysis, are the St. Vitus's dance, and the tremblings which affect the workmen employed in lead or quicksilver mines, barometer-makers, gilders, and looking-glass makers who silver the mirrors. I shall speak only of the last affection, which I have often had occasion to observe; the symptoms of which, I believe, are not generally known, although they are very interesting, and resemble very nearly those described by Rammazini when treating of the diseases of gilders. The effects produced by mercury, depend upon the state of the metal, its quantity, and the time any one is exposed to its action. This action may either be very speedy,

or may be some time in showing itself, as the following cases prove.

A person who was filling a large spiral thermometer, happened to break it over a chaffing dish which contained a great deal of fire; the mercury, which was already very warm, immediately began to evaporate, so that the workman received in an instant, a great quantity of the vapours into his mouth and nostrils. Twelve hours afterwards, a complete salivation came on, and the patient was feverish. All the symptoms produced by the mercury applied in hot vapour to the part upon which it acts with a sort of predilection, had disappeared in about ten days.

The looking-glass silverers are affected with symptoms which observe a different course; the mercury they make use of, does not produce salivation, but gives rise to tremblings, which do not begin to show themselves until after some months of constant labour. The metal which affects the silverers is in the form of grey powder, very volatile, and which they call *avivure*.

The avivure, treated by nitric acid, gives three fourths of mercury and one fourth of tin, slightly oxydized; the same results were obtained by distillation. The *regrature* for mirrors, submitted to the same analyses, gives, on the contrary, three fourths of tin and one fourth of mercury; this forms also a grey powder, but not so fine, consequently less volatile, and less dangerous.

Physicians seldom have occasion to see the trembling peculiar to these workmen, because they do not apply to any practitioner to cure them; they employ a method nearly as ancient as the disease itself, which consists in the use of baths and strong sudorifics, either alone or combined with mild purgatives. Formerly, the workmen employed in the manufacture of mirrors at Paris, were accustomed to silver them during one week, and be busied about other work for the following six weeks: for some years past, they have usually silvered them one day in every week, which is the more healthy practice for them; but those persons who are constantly employed in this manner, are not long before they experience very severe tremblings. First, they feel slight pains in the joints, particularly

in the wrists, the elbows, the knees, and the feet; then comes on a universal excitement, the head is affected, and very soon the trembling, which begins in the hands, becomes universal, if the cause which occasioned it is not withdrawn; they then speak with difficulty. I have seen a patient, in whom the convulsive shaking was so violent, that he could not handle any thing without hazard of breaking it; his legs were contracted in an extraordinary manner, so that when he descended a staircase, he was sometimes obliged to jump two or three steps; to avoid this, he accustomed himself to go down backwards on his hands. He was obliged to drink out of a dish, that he might carry the fluid more readily to his mouth, and to prevent breaking the glass between his teeth, from the convulsive affection of his jaws. When a person is in this state he is very irascible, and a fit of anger so increases the shaking, that if he were not sitting, he would infallibly fall down.

When imperious necessity compels the workmen to continue respiring this metallic atmosphere, their countenance becomes pale, and takes on an expression of intoxication, their intellects gradually fail, and they come at last to a sort of idiotism, which is not got the better of after it has continued some years; they languish in this state a longer or shorter time, and generally die of consumption; sometimes they fall a victim either to asthma or obstruction in some of the abdominal viscera, or they are carried off by apoplexy.

Workmen employed in this business, can seldom continue at it longer than eight, twelve, or eighteen years, without experiencing several attacks, to which they infallibly fall victims if they pursue their employment, even with the ordinary precautions.

I knew a workman who had followed this business twenty-five years; it is true, that within that time he had remained four years without doing any work; he had had many attacks, and they had left a trembling upon him which obliged him to change his business. This workman told me, that he had never known, in the faubourg Saint-Antoine where he dwelt, any one who could continue at the work eighteen years; that he believes he could not have stood it so long, but that he was accustomed not to open his mouth in the workshop, for he had

no doubt, that the accidents that happened, were owing to the avivure which they respired during their work.

I am persuaded, that with the following precautions, one cause of these severe diseases might be removed from these unfortunate people: They ought to have a large open workshop, set apart entirely for silvering the mirrors, and to be there at no other time; while they are at work, they should apply over their mouth and nose a muslin handkerchief, which would suffer the air to pass through, and intercept the metallic particles. The tables should be placed before a chimney, in which there should be a clear fire, and behind the workmen should be an open door or window, so that the avivure may be drawn towards the fire; the workmen should also accustom themselves to take a bath from time to time, to live well, to clothe themselves well, and to avoid excess of every kind. The treatment adopted by these workmen is frequently serviceable. We can easily conceive, that the use of sudorifics, aided by mild purgatives and bathing (especially leaving off respiring the noxious vapour), cannot but be salutary. I have had occasion to observe many times, that a strong dose of opium, or a state of half intoxication, diminished the tremblings, and gave a sort of steadiness to the patient. In the case of intoxication, it is curious to see him who was trembling, regain steadiness in proportion as he drinks: while he who was steady at first, is quite tottering by the time he leaves off drinking.

On a Case of Nervous Affection cured by Pressure of the Carotids; with some Physiological Remarks. By C. H. Parry, M. D. F. R. S.

[From the Philosophical Magazine, for August 1811.]

Observing that the Royal Society, of which I have the honour to be a member, occasionally receives communications illustrative of the laws of animal life, which are indeed the most important branch of physics, I take the liberty of calling their attention to a case, confirming a principle which I long ago published, and which, I believe, had never till then been remarked by pathologists.

About the year 1786, I began to attend a young lady, who laboured under repeated and violent attacks, either of headach, vertigo, mania, dyspnœa, convulsions, or other symptoms usually denominated nervous. This case I described at large to the Medical Society of London, who published it in their Memoirs, in the year 1788. Long meditation on the circumstances of the case led me to conclude, that all the symptoms arose from a violent impulse of blood into the vessels of the brain; whence I inferred, that as the chief canals conveying this blood were the carotid arteries, it might perhaps be possible to intercept a considerable part of it so impelled, and thus remove those symptoms which were the supposed effect of that inordinate influx. With this view, I compressed with my thumb one or both carotids, and uniformly found all the symptoms removed by that process. Those circumstances of rapidity or intensity of thought, which constituted delirium, immediately ceased, and gave place to other trains of a healthy kind; headach and vertigo were removed, and a stop was put to convulsions, which the united strength of three or four attendants had before been insufficient to counteract.

That this extraordinary effect was not that of mere pressure, operating as a sort of counteracting stimulus, was evident; for the salutary effect was exactly proportioned to the actual pressure of the carotid itself, and did not take place at all, if, in consequence of a wrong direction either to the right or left, the carotid escaped the effects of the operation.

This view of the order of phenomena was, in reality, very conformable to the known laws of the animal economy. It is admitted, that a certain momentum of the circulating blood in the brain is necessary to the due performance of the functions of that organ. Reduce the momentum, and you not only impair those functions, but, if the reduction go to a certain degree, you bring on syncope, in which they are for a time suspended. On the other hand, in nervous affections, the sensibility and other functions of the brain are unduly increased; and what can be more natural than to attribute this effect to the contrary cause, or excessive momentum in the vessels of the brain? If, however, this analogical reasoning has any force in ascertaining the principle, I must acknowledge that it did not occur to me till

twenty years afterwards, when a great number of direct experiments had appeared to me clearly to demonstrate the fact.

From various cases of this kind, I beg leave to select one which occurred to me in the month of January 1805.

Mrs. T. aged 51, two years and a half beyond a certain critical period of female life, a widow, mother of two children, thin, and of a middle size, had been habitually free from gout, rheumatism, hæmorrhoids, eruptions, and all other disorders, except those usually called nervous, and occasional colds, one of which, about two years and a half before, had been accompanied with considerable cough, and had still left some shortness of breathing, affecting her only when she used strong muscular exertion, as in walking up stairs or up hill.

In February 1803, after sitting for a considerable time in a room without a fire, in very severe weather, she was so much chilled as to feel, according to her own expression, "as if her blood within was cold." In order to warm herself, she walked briskly for a considerable time about the house, but ineffectually. The coldness continued for several hours, during which she was seized with a numbness or sleepiness of her left side, together with a momentary deafness, but no privation or hebetude of the other senses, or pain or giddiness of the head. After the deafness had subsided, she became preternaturally sensible to sound in the ear of the affected side, and felt a sort of rushing or tingling in the fingers of the left hand, which led her to conclude that "the blood went too forcibly there."

Though the coldness went off, what she called numbness still continued, but without the least diminution of the power of motion in the side affected. In about six weeks, the numbness extended itself to the right side.

Among various ineffectual remedies for these complaints, blisters were applied to the back, and the inside of the left arm above the elbow. The former drew well. The latter inflamed without discharging; so that a poultice of bread and milk was put on the blistered part. After this period, the muscles of the humerus began to feel as if contracted and stiff; and these sensations gradually spread themselves to the neck and head, and all across the body, so as to make it uncomfortable for her to lie on either side, though there was no inability of motion.

She now began to be affected with violent occasional flushings of her face and head, which occurred even while her feet and legs were cold, together with a rushing noise in the back of the head, especially in hot weather, or from any of those causes which usually produce the feelings of heat.

It is difficult to give intelligible names to sensations of a new and uncommon kind. That which this lady denominated numbness diminished neither the motion nor the sensibility of the parts affected. It was more a perception of tightness and constriction, in which the susceptibility of feeling in the parts was in fact increased; and the skin of the extremities was so tender, that the cold air produced a sense of uneasiness, the finest flannel or worsted felt disagreeably coarse, and the attempt to stick a pin with her fingers caused intolerable pain.

In the month of September 1803, not long after the application of the blisters, she experienced, in certain parts of the left arm and thigh, that sensation of twitching which is vulgarly called the "life blood," and which soon extended itself to the right side. Shortly afterwards, she began to perceive an actual vibration or starting up of certain portions of the flexor muscles of the fore-arm, and of the deltoid on the left side; not so, however, as to move the arm or hand.

This disorder had continued with little variation to the period of my first visit. The vibrations constantly existed while the arm was in the common posture, the fore-arm and hand leaning on the lap. If the arm were stretched strongly downwards, the vibration of the flexors ceased, but those of the deltoid continued. The arm being strongly extended forwards, all ceased; but returned as soon as the muscles were relaxed. The vibrations were of different degrees of frequency, and at pretty regular intervals, usually about 80 in a minute. They were increased in frequency and force by any thing which agitated or heated the patient, and were always worse after dinner than after breakfast. The pulse in the radial artery was 80 in a minute, and rather hard. That in the carotids was very full and strong; and each carotid appeared to be unusually dilated for about half an inch in length, the adjacent portions above and below being much smaller, and of the natural size. I much regret that I find in my notes of this case, no inquiry whether there

was any coincidence between the systoles of the heart and the muscular vibrations. The patient's feet were usually cold, and her head and face hot. The feeling in her limbs was much as I have above described, except that the sensibility was somewhat less acute than it had been, and she complained of a tightness all over her head, as if it had been bound with a close night-cap. Her sleep was usually sound on first going to bed, but afterwards, for the most part, interrupted by dreaming. Bowels generally costive: appetite moderate: no flatulency or indigestion: tongue slightly furred, without thirst: urine variable, but generally pale.

The late Mr. George Crook, surgeon, was present while I made these examinations; and when we afterwards conversed together, I remarked to him, that if my theory of the usual cause of spasmodic or nervous affections were well founded, I should probably be able to suppress or restrain these muscular vibrations of the left arm, by compressing the carotid artery on the opposite or right side; while little effect might perhaps be produced by compressing the carotid of the side affected. The event was exactly conformable to my expectation. Strong pressure on the right carotid uniformly stopped all the vibrations, while that on the left had no apparent influence. I may add that these experiments were afterwards, at my request, repeated on this lady in London by Dr. Baillie, and, as he informed me in a letter, with a similar result.

It is perfectly well known to many of the learned members of this society, that irritations of the brain, when of moderate force, usually exhibit their effects on the nerves or muscles of the opposite side of the body; and in the case before us, it is difficult to understand how the suspension of these automatic motions could have been produced by this pressure of the opposite carotid, in any other way than by the interruption of the excessive flow of blood through a vessel morbidly dilated; in consequence of which interruption, the undue irritation of the brain was removed, and the muscular fibres permitted to resume their usual state of rest.

From these and many other similar facts, I am disposed to conclude, that irritation of the brain, from undue impulse of blood, is the common though not the only cause of spasmodic

and nervous affections; and I can with the most precise regard to truth add, that a mode of practice conformable to this principle has enabled me, during more than twenty years, to cure a vast number of such maladies which had resisted the usual means.

An investigation of all the modifications of the principle itself, and of its numerous relations to therapeutics, would be inconsistent with the views of the Royal Society, and must be reserved for another place.

Bath, Dec. 8, 1810.

Facts and Observations on Quickening.

[From the Medical and Physical Journal, for June 1812.]

Præterea, si inmortalis natura animai
Constat, et in corpus nascentibus insinuatur.—*Lucretius*, lib. 3.

Opinions and investigations which respect the nature and mode of existence of that immortal principle called the *Soul*, prior to its taking possession of its corporeal tenement, have never established any other fact so firmly, as that the human intellect possesses the property of perplexing a subject, to a most extravagant degree, by the aid of learning and philosophy. The notion of the pre-existence of the human soul, consisting, according to Pythagoras and Plato, of a divine idea united to a portion of the *anima mundi*, has spread far and wide. In Greece the principle of the metempsychosis took full possession of the most refined and refining philosophers; and the reminiscence* of Plato resounded in the groves of the academy, awakening the imagination to the recognition of events which had passed in former modes of existence, when the soul, travelling

* Intellection is the operation of the understanding contemplating intelligible forms, or ideas. It is twofold: the first, that of the soul contemplating ideas before it descends into the body; the other, that which it exercises after it is immersed in the body. The first kind of knowledge consists in the recollection of those things which the mind had known in its pre-existent state, and differs from memory in the object; memory being employed upon sensible things, reminiscence upon things purely intelligible.—*Vide Brucker's Historia Critica Philosophiæ.*

from being to being, now incited a hero at the Trojan war, now flushed the cheek of some fair Helen, flew in birds, swam in fishes, or crawled, in penal degradation, in some horrid reptile. Absurd, or devoid, at least, of sober certainty, as the metempsychosis must be, we find that both the savage and the sage, at one period of the world, admitted its validity. Among the celtic* nations, in the religions of Hindu, and the oriental tribes both of the continent and islands of the Indian Ocean, we meet with this opinion.†

Little suited as these observations may at first seem to a Medical Journal, they are not totally irrelevant, because this notion of the separate existence of the soul, and its capability or property of being infused into bodies at particular periods,

* A passage in Lucan ascribes the doctrine of transmigration to the Northern nations.

——————————— Vobis auctoribus, umbræ
Non tacitas Erebi sedes, Ditisque profundi
Pallida regna petunt: regit idem spiritus artus
Orbe alio: longæ, canitis si cognita, vitæ
Mors media est. *Phars.* lib. 1. v. 454.

† In the institutes of *Menu*, there is a scale of the penalties to which the immortal soul is doomed. "For sinful acts, that are mostly corporeal, a man shall assume, after death, a vegetable or mineral form: for such acts, mostly verbal, the form of a bird or beast: for sinful acts, mostly mental, the lowest of human conditions." The Jewish *Cabbala* holds that all souls were produced at once, and pre-existed in Adam; and that every human soul has two guardian angels, produced by emanation, at the time of the production of souls. The cabbalistic doctrine is minute and elaborate in its investigation of the human soul, which it describes as consisting of four parts: *Nephesh*, or the principle of vitality; *Ruach*, or the principle of motion; *Neschamah*, or the power of intelligence; and *Jechidah*, or the divine principle. The old doctrine of *Quickening* might have raised an implacable war between *Nephesh* and *Ruach*. Not very remote from the doctrine of the *Cabbala* was that opinion of Plato which makes the soul consist of three parts: the first, the seat of intelligence; the second, of passion; the third, of appetite. The Egyptians, according to Herodotus and Diogenes Laertius, believe, that, when the body decays, the soul passes into some other animal, which is then born; and that, after it has made the circuit of beasts, birds, and fishes, through a period of 3000 years, it again becomes an inhabitant of a human body. To collect and detail the opinions of Aristotle, Socrates, Pythagoras, Empedocles, Democritus, Heraclitus, Epicurus, Strabo, Dicearchus, &c. &c. on this abstruse subject, would hardly reward the labour.

"Much of the soul they talk, but all awry."—*Milt. P. R.* iv. 313.

countenanced an hypothesis that professed to explain a natural fact occurring, under very interesting circumstances, to the human female. If it were admitted that the principle of animation, or the soul, was added to the embryo at any distinct period of gestation, posterior to its first formation, it might account for the peculiar sensation which is experienced by women about the sixteenth week of pregnancy; and which sudden infusion not only the vague and visionary theorist believed, but the sober judge on the bench, and the grave doctor in the professional chair, taught or enforced. When the professor mixed up his physiology with the abstract metaphysical notion of the pre-existent state of the soul, and its application to the corporeal fabric at some particular period of utero-gestation, his mistake was no further important, perhaps, than as it led his pupils aside from the plain path of truth, into the tangled wilderness of error, and suppressed the still small voice of Nature with the obstreperous jargon of the schools; but, when the judge pronounced on the innocence or criminality of actions on this hypothesis, truth was not only violated, but society sustained an injury.

As the opinion above alluded to has been, if it is not even now, very generally held, it may not be quite improper, to state what is, probably, the true nature of the sensation called QUICKENING.

I need not cite evidence to prove that the ancient philosophers and physicians, and the earliest of the modern professors of the obstetric art, believed, that the peculiar sensation of Quickening, as it is erroneously called, occurred when the fœtus received the principle of vitality, or became animated; and that the specific feeling in the mother was produced by its first motions. Courts of justice recognized this hypothesis also, as a principle by which the degree of criminality in cases of *abortus procuratus* were to be determined. If these were the opinions of times long past away with their errors and their delusions, how stands the question now? This will be answered by allowing the grave and learned leaders of the *ars obstetrica* to tell their own tale.

Dr. Denman (Introduction to the Practice of Midwifery, 5th edit. 1805,) says, " By the term *Quickening* is understood

the first sensation which the mother has of the motion of the child which she has conceived. This happens at different periods of pregnancy, from the tenth to the twenty-fifth week, but most commonly about the sixteenth after conception; yet the motion of the child is in *some women so obscure*, or such little attention is paid to it, that it is not perceived or regarded, and in others so indistinct as to be confounded with various other sensations. It is not unusual for women to have a few drops of blood discharged from the vagina at the time of *quickening;* but the symptoms which attend are generally such as are occasioned by surprise or agitation from any other cause, as fainting, or some hysteric affection." Of the changes which succeed immediately upon the sensation of quickening he speaks with more precision;* and, if such a fact did not frequently occur, it would be surprising that, when so near the truth, he had not distinctly seen what the cause of the sensation of *quickening* really was. But it is left as much in the dark, as it was at any former period. The changes consequent on quickening are not quickening itself; they are the effect of this alteration in the female economy, whatever it may be.

Professor Hamilton (*Outlines*, 5th edit. 1806) has almost stepped upon the true nature of this peculiar sensation. " Faintings," he says, " seldom occur," (that is, during pregnancy,)

* These changes have no connexion whatever with the first motions of the child, but are altogether produced by the alteration of position in the uterus. " The changes which follow quickening, (the doctor says,) have been attributed to various causes: by some it has been conjectured that the child then acquired a new mode of existence; or that it was arrived at a size to be able to dispense with the menstruous blood, &c. Others have believed, that the changes ought to be assigned merely to the enlargement of the uterus, increased *by the growth of the ovum* to such a size, that it was supported above the brim of the pelvis; by which means all the inconveniences which arose from the dragging or subsistence of the uterus in the vagina were removed: and this seems to be the true reason." But these changes, as before observed, have no manner of connexion with quickening, as referred to the first motions of the fœtus; and the confounding under this term the first motions of the child, with the specific sensation occasioned by the sudden change of the womb's position, and then explaining the alterations in the woman's health, by referring them to quickening, or the first perceived motions of the child, are so illogical, as hardly to have a trace of the true fact. Neither the specific sensation, nor the ceasing of the irritability of early pregnancy, depend, in any degree, on the first motions of the fœtus.

" except about the time of *quickening*. They seem to arise from the sudden change of position of the uterus, emerging from its close confinement within the bony parietes of the pelvis, and from the irritation *communicated by the child's motion*." He does not however intend here to explain what *quickening* itself is, but looks to one of its phenomena, deliquium; and he hangs upon the old opinion of the child's motion, as an efficient cause of the mother's sensation. So little did he, probably, understand of the real nature of this incident in 1806, that he must be considered as having left it in absolute darkness; though he approached to the truth, the veil was not removed. In the year 1811, his countryman, John Burns, who, when writing on the " Principles of Midwifery," could not but have seen the professor's " Outlines," had no glimpse of the true nature of *quickening*. " In some cases, very little disturbance is produced," (that is, by the impregnated state,) he says, " and the woman is not certain of her condition until the child quickens, which happens about the fourth or fifth month of pregnancy, in a few instances at the end of the third. This quickening is attended with a sensation of motion, or fluttering in the lower belly, and is not unfrequently accompanied with faintishness or hysterical irritation." And again; " when the women have any doubt with regard to their situation, they generally look forward to the end of the fourth month as a period which can ascertain their condition; for at this time, or a little sooner or later in different women, *the motion of the child is first experienced, or it is said to* QUICKEN."

The London Practice of Midwifery, Edit. 1811, rumoured to be a transcript of Dr. Clarke's Lectures, says but little on the subject; and, even in what it does say, blunders egregiously. " The diseases of irritation cease just *before* the time of quickening," is the assertion of this London Practice. Just *after* the time of quickening is the fact: and why this happens can be explained. I must do Dr. Clarke himself the justice, however, to state that this is not his opinion. The complaints of early pregnancy, he says (Essays, &c. 2d edit. 1806), will be relieved by quickening;* But he no where indicates, as far as I

* Does the doctor mean to refer here to the motion of the child, or to the change of position in the uterus, under the term quickening. If he refers

know, what the nature of this quickening is. The latest and most respectable Medical Dictionary we have, published in 1809, and which may fairly be admitted to have collected opinions to the period of its publication, when endeavouring to lay down data for regulating the reckoning in pregnancy, says "the whole should be corrected by the *quickening, the period when the child's motion is perceived.*"*

From this evidence, it may unquestionably be inferred, that the latest and most esteemed writers on midwifery still hold the opinion that *Quickening* is a peculiar circumstance of the fœtus; and that this circumstance is no other than its first motions consequent on its new mode of existence; which, being felt by the mother, produce the extraordinary and alarming sensation described under the above denomination.

I must reject, however, the received opinion, that the specific sensation experienced by the mother, under the term *Quickening*, is to be ascribed to the first perceptible motion of the fœtus, when that fœtus is vaguely said to become animated; because,

by this term to the first motions of the child, he is wrong as to the complaints of early pregnancy then ceasing: if he refers by this term to change of position in the uterus, he is wrong in the application of the term, though right in asserting that the complaints of early pregnancy then cease. The change of the position of the uterus is the efficient cause of the cessation of these complaints.

* A most respectable Medical Review, having occasion to notice *quickening*, in April 1810, says, "the only physiological question which occurred during the course of this trial (the trial of Pizzy and Codd, in 1808, for procuring Abortion), and perhaps the only one which properly comes under our consideration, was in regard to the time in which a child quickens. A medical witness, examined, deposed that it took place in about eighteen weeks, sometimes at fourteen, and sometimes not till twenty weeks, but mostly about eighteen; and he never knew it so late as twenty-five weeks, though he could not say that it sometimes may not happen until the 21st or 22d. Upon the subject of quickening, we may observe," the reviewer proceeds, "that, although recognized by popular belief, and even by the laws of the land, as something definite, it is not so. The growth and development of the child is gradual and uniformly progressive. During no period of gestation does any sudden revolution or change take place; *and what is called quickening is merely the motions of the child becoming sensible to the mother.*" —*Edinburgh Med. and Surg. Jour. April* 1810. 248.

1st, The sensation of quickening* is not constant and universal: some women never experience it, others with some of their children only.

2d, It has a distinct character from any subsequent motion of the child: no woman ever admits that it resembles, in the slightest degree, the struggles of the fœtus.

3d, This sensation is never repeated in the same pregnancy, which must happen if it arose from the motion of the child.

4th, It is totally incomprehensible that any motion of which the fœtus is capable, in the fourth month, should communicate such a sensation to the mother as to produce deliquium *animi*.

Considering then that the sensation called *Quickening* is an accidental circumstance, and not depending on any conjectural sudden imparting of life to the embryo, which, if a fact, must be a permanent occurrence; that there is no parity between the effect and the assumed cause; and that this effect, if it arose from any motion of the child, must produce similar sensations in the mother during the subsequent period of gestation, when its struggles are still more palpable; I am compelled to observe, that this opinion is only proper for the dark ages of scholastic confusion, and unsuited to that philosophy which now directs our researches into the laws and operations of Nature.

On the ground above stated, presuming that the opinion which refers the sensation denominated, with gross want of precision, *quickening*, to some sudden imparting of life to the fœtus, or to its trifling and obscure motions when first perceived by the mother, to be altogether untenable; I believe the phenomena, observed without prejudice, will bear me out in the assertion, that it does not arise from the fœtus but from the uterus, and belongs not to the child but to the mother.

It is a known fact that the uterus, in the early period of pregnancy, descends into the pelvis, and there remains, usually,

* I do not speak of those at first obscure, but gradually increasing, motions of the child, felt by every pregnant woman, and with numerous repetitions during gestation; but of that singular and specific sensation felt but once in the same pregnancy, always disordering the woman for a time, often occasioning her to faint, and which has been pointed out as marking the period when the embryo receives the principle of animation under the term *quickening*.

to the latter part of the fourth month; and that, as it enlarges, it necessarily rises above the pelvis into the abdomen. There are three circumstances or facts connected with this change of local position of the uterus.

1st, The ascent of the impregnated uterus from its position in the pelvis to its subsequent station in the abdominal cavity, is sometimes gradual and unobserved: then the sensation called *quickening* is *not* felt.

2d, The uterus is sometimes so impacted in the pelvic cavity, as not to reach its final station within the abdomen, without the assistance of art: then occurs retroverted uterus, during which *quickening* is *never* felt.

3d, At other times, and those frequent though not constant, there exists some slight impediment to the ascent of the uterus; *which being suddenly overcome, it (the uterus) rises at once into the abdominal cavity, constituting what has so long been referred to the fœtus, under the term quickening.*

The sudden intrusion of the volume of the uterus among the abdominal viscera, parts of high sensibility, accompanied with as sudden a removal of pressure from the iliac vessels, is equal to produce the sensation called *quickening.*

No woman *quickens* (I am compelled yet to use this strange term, improper when referred to the fœtus, and absurd,* certainly, when applied to the mother,) while the uterus remains in the pelvis, nor when it has risen above the brim of that bony cavity and is settled in its place in the abdomen; *but the sensation is felt in transitu, at the moment when the uterus, removing from the pelvis, enters the abdominal cavity.*

* Our best philologists have used the word *quicken* in the absurd sense as applied to the mother. The verb active to quicken is of Saxon etymology, and literally means to *make alive.* The verb neuter to quicken, Johnson explains, *to become alive; as a woman quickens with child:* and he cites passages which prove it can apply only to the embryo.

They rub out of it a red dust, that converteth after awhile into worms, which they kill with wine, when they begin to *quicken.* *Sandys.*

These hairs which thou dost ravish from my chin,
Will *quicken* and accuse thee. *Shakspeare.*

This postulate* admits of verification or rejection by experiment and observation. If those who are extensively employed in the practice of midwifery, will watch the sensation of *Quickening*, simultaneous with the change of locality in the uterus, they will find how near it is to a demonstration.

I am not aware that the specific sensation known so long by the term *quickening*, occurring to *some* pregnant women, has been thus explained before:† but I think this explanation removes all difficulty as to the natural fact, as well as it does also the metaphysical jargon about the sudden infusion of the vital principle into the *embryo*.

London, March 30, 1812. MEDICUS.

An Account of a Case of Lithotomy; with Practical Remarks.
By JAMES BARLOW, Surgeon, Blackburn, Lancashire.

[From the Edinburgh Medical and Surgical Journal, for July 1812.]

IN an art of such extended importance as surgery, which involves so many of the natural evils to which mankind are unavoidably exposed, and where disease is so frequently diversified and modes of treatment varied, the recording of such events, whether as terminating favourably or fatally, is a method of conveying information, which is justly sanctioned by the most celebrated professors of the art.

Hence I have been induced to lay an account of the follow-

* The term *postulate* does not apply to the state of my own mind; but I concede that my position is assumed, until the fact has been examined, and the investigation pursued by others.

† That this opinion is not at this moment new to myself, however, I can prove, by a note in the Med. and Phys. Jour. for July 1810, p. 38, where, having occasion to notice *quickening* in consequence of the trial of Pizzy and Codd for procuring abortion, I observed, "quickening, as it is popularly termed, is a sensation of a peculiar quality, occuring to most women at some period of utero-gestation, and is believed to be the first indication of life in the fœtus. Perhaps this sensation has no dependence on the life of the fœtus, but is simply produced by the *impregnated uterus rising suddenly out of the pelvis into the cavity of the abdomen.*" More reflection and additional observation, make me now speak positively to this fact, which, in 1810, I gave to the public with some hesitation.

ing case of lithotomy before the public, more particularly as its history is distinguished by some peculiarity of circumstances; and in doing this, I have also availed myself of the opportunity of interspersing a few practical remarks connected with the subject, which have suggested themselves to my mind during the progress of the patient's cure.

About five years ago, I was consulted by Richard Holden of this neighbourhood, a stout, corpulent, robust man, then about sixty years of age, on account of great pain when passing his urine, accompanied with very frequent provocations to propel it. He informed me, that for some years past he had occasionally discharged both blood and mucus from the urethra, and that any violent bodily exercise was usually the forerunner of the former indication of calculous affection. These, together with other ordinary symptoms, led me to suspect a stone in the bladder, and I proposed passing a sound into that viscus, in order to adjust the opinion I had preconceived on the nature of the case; this proposal was, however, rejected, from an idea entertained by the patient of the pain which the introduction of an instrument into the bladder must unavoidably occasion.* In this state of incertitude my patient absented himself from me, and continued with frequent intermissions of pain till the sixth of November 1811, a lapse of five years, when I was requested to visit him. On my arrival, I was informed that he had not been able to evacuate his urine for nearly two preceding days and nights. On laying my hand on the abdomen, the patient complained of a considerable degree of pain in the region of the bladder, which was connected with tension, and the scrotum and ambient parts were of a dark livid colour. The catheter was immediately introduced, and my former opinion fully confirmed by the instrument striking against a stone, as was also notified by the sound emitted to the ear very distinctly. Nearly two quarts of dark-coloured

* It may be observed, that although the neck of the bladder be the part chiefly affected in a fit of the stone, nevertheless, it not unfrequently happens, that upon the sound being passed into the bladder, the stone is forced from its situation, and the patient experiences relief for a considerable interval, and till the stone, from some cause, becomes pushed into its former situation.

urine were drawn off, which afforded temporary relief; the warm bath was recommended, a laxative glyster was administered, and an aperient mixture directed to be taken in divided doses, which produced several copious evacuations by stool, and reduced the tension, and considerably relieved the soreness of the abdominal region. Nevertheless, the retention of urine still continued, caused, I apprehend, by a calculus lodged in the vicinity of the neck of the bladder; for every time the catheter was passed it was resisted by the presence of a stone, and little or no water could be extracted without first pushing the point of the instrument against it, and raising the stone from its situation, and keeping the instrument in this position till the bladder was emptied. By this manœuvre the impediment was surmounted, and the urine evacuated once or twice every twelve hours during several succeeding days, by the use of the common silver catheter, until I prevailed on my patient to be removed to the town (Blackburn,) where I had an opportunity of paying more particular attention to the urgency of the case. On his arrival, I introduced a flexible metallic catheter into the bladder, fitted with a small cork to plug up the end; the fore-finger being passed up the rectum, served to bend the apex of the instrument under the arch of the pubes, where it was permanently fixed, so that he could evacuate his urine *ad libitum*.

The indispensableness of the finger in the rectum, whilst passing the instrument, afforded me an opportunity of ascertaining the morbid indurated state of the prostate gland, which was greatly enlarged, and in a very rigid condition.*

* The symptoms of stone in the bladder, and a morbid condition of the prostate gland being in some respects similar, it is highly necessary that the surgeon should invariably pass the finger up the rectum prior to the operation, and if the gland be enlarged, it will be discovered with the greatest facility. By such timely investigation, the surgeon will be governed in the various stages of the operation, and thereby be enabled to form a pretty accurate idea of the determinate extent of the incision of the neck of the bladder, and necessary extension of the blade of the bistoury, prior to its introduction into the bladder.

The presence of a stone in the bladder may generally, by attention, be distinguished from an irritable state of that viscus; for in the former affection, and during the discharge of urine, the pain increases till the last drop is

Notwithstanding the antiphlogistic regimen was rigorously adhered to, there remained a considerable degree of soreness on the region of the pubes, attended with quick pulse and fever, insomuch that I did not then propose the operation of lithotomy, being aware of the consequences that might ensue from the attendant symptoms, excited by consequent irritation, the frequent effects of calculi, and a long distended state of the bladder; nevertheless, these unfavourable symptoms gradually abated, together with the tension of the abdomen, and the operation became admissible;* and after being determined on, and the preparatory regimen adopted, I performed it on the seventeenth instant (November), in the presence of two assisting surgeons and the necessary attendants. The patient being placed and secured in a horizontal position upon a steady table of commodious height, and supported by pillows with the breech projecting over the edge of the table, the first stages of the operation were conducted in the usual manner, and with tolerable facility. On the membranous portion of the urethra being laid open with the scalpel to the commencement of the prostate gland, the beak of the bistouri caché was inserted into the groove of the staff, the handle of the staff was taken hold of with the left hand, and raised from the right groin of the patient to nearly a right angle with the body; the bistouri was then carried gently forwards into the bladder and the staff taken out; the cutting edge of the bistouri being turned laterally towards the left ischium of the patient, and raised from its

voided; whereas, in the latter case, relief is observed in a reverse ratio,—for as soon as the water begins to flow the patient is somewhat relieved, and when the whole is evacuated there is no pain left, and the functions of the bladder are usually restored.

* Daily observation evinces, that simple irritation excited in the bladder, by the presence of a stone in that viscus, not unfrequently subsides on the primary exciting cause being removed by its extraction without impeding its functions.

It does not appear that a low degree, even of frequent irritation, excited by a stone in the bladder, is altogether unfavourable to the success of the operation of lithotomy, when performed during an interval of cessation from pain; but if there exist any nephritic affection, the danger is then manifestly increased, and the operation should be undertaken with great caution, and deferred, if possible, till such pain wholly ceases, and the consequent irritation of the system subsides.

sheath, it was withdrawn† nearly in a horizontal direction; and in executing this step of the operation, I perceived an unusual resistance‡ and grating sensation, as if cutting through a cartilaginous substance. The fore-finger of the left hand was now passed as high as possible into the bladder, through the opening made by the bistouri, and with difficulty the surface of a stone was felt; for owing to the man's state of corpulency, the greatest part of the hand became buried in the wound. The forceps were then carefully introduced by the side of the finger, which served as a guide to detect the stone. The finger being withdrawn, the stone was seized by the blades; but from the great expansion of the handles, I was led to believe that the calculus was either very large, or otherwise taken hold of in an unfavourable direction. To ascertain this incident, I endeavoured to reach the stone by insinuating the finger betwixt the extended blades of the forceps, but was opposed by the bulk of the prostate gland; for it appeared to occupy so considerable a space, that its extent could not be wholly traced by the finger in any direction. I therefore judged it expedient to let go the stone, and attempt to seize it in a less diameter, and after using every possible means in my power, I was obliged to abandon this project; and the extent and rigidity of the prostate, and its unyielding condition, induced me to enlarge the incision; for on every attempt to extract the stone, the body of the gland was brought forwards into sight, and appeared to completely wedge up the space betwixt the two rami ischii. Thus situated, and whilst the left hand was employed in gently drawing forwards the forceps along with the stone, the right was engaged in dilating the wound with the scalpel in a line with the external incision, where the resistance opposed

‡ The bistouri caché possesses an important advantage over the gorget, which no construction of that instrument can possibly surmount: for the surgeon has it in his power to adapt the blade of the bistouri to the exigency of every individual case, prior to its introduction into the bladder, and should the stone be suspected to be of unusual magnitude, or less than what was at first imagined, the screw of the handle may be moved whilst the apex is in the bladder, and the cutting part regulated accordingly.

† The enlargement of the prostate gland, in this instance, seems most probably to have been occasioned by the irritation which the long retention of the stones in the bladder had excited on the functions of that organ.

the chief obstacle; in this manner sufficient room was made, and the transmission of the stone effected. It was of an oval shape, and its long diameter 2.25, and its short 1.75 inches. A female sound was immediately passed into the bladder, and another stone detected larger than the first, and which was extracted with proportionate difficulty. It was also oval, but measured 2.6 inches one way, and 2.1 the other. From the different situations in which I had an opportunity of recognizing the prostate gland of this patient, both by the finger passed up the rectum and through the wound in perineo, its lateral lobes evidently projected considerably on the rectum, and it appeared the shape and size of the gizzard of a goose.* Several arteries were divided in the operation, which required the ligature; and there was a considerable oozing of blood, which appeared to come from the divided edges of the prostate gland. A canula was introduced into the wound, which by its pressure on the incised portions of the gland, prevented the blood from making its way into the bladder, and soon stopped the bleeding.

A plaster of lint, spread with cerate, was applied to the wound; the patient was then conveyed to bed, and his knees brought together, and secured by means of a tape passed round his thighs. A draught composed of sixty drops of tinct. opii was administered, and the patient left to take repose. On cal-

* Although a morbid enlargement of this gland may induce an unfavourable prognostic of the success attendant on lithotomy, yet is not an insuperable reason for its being altogether abandoned; for daily observation shews, that this organ, when indurated and enlarged, will frequently endure much violence with comparative impunity.

The symptoms characteristic of stony concretions in the bladder, and an indurated condition of the prostate gland, are sometimes confounded with each other. Hence will appear the necessity of discriminating betwixt these two diseases; and an attentive observer may generally form a tolerably accurate criterion, by attending to the nature of the discharge from the urethra; for in a disease of the prostate gland alone, the discharge is generally a mixture of viscid mucus and urine, and when connected with calculi in the bladder, it becomes frequently incorporated with sabulous matter.

A thickening of the coats of the bladder, even if it could be ascertained prior to the operation, yet ought by no means to prevent its being performed, unless connected with some other disease, for I have witnessed many cases of this description which terminated favourably.

ling in the evening, I was informed that the medicine had not produced sleep; he appeared restless, with quick pulse. There was no tension or pain about the region of the bladder, nor any hæmorrhage from the wound, and the urine flowed *guttatim* through the canula without interruption.

A warm bath was immediately procured in the room, into which he was put and remained twenty-five minutes, which afforded some temporary relief, but without producing syncope or diminishing the vibratory force of arterial action. On being removed to bed the opiate draught was repeated, but did not induce the least inclination to sleep the whole of the night. In the morning the canula was removed and the wound dressed as before. A saline mixture, with antimonial wine, was directed to be taken. An aperient glyster was administered for several succeeding days, and occasional purgatives exhibited to stimulate the torpid disposition of the intestines, all which produced their desired effects. The warm bath was repeated twice every twenty-four hours for ten days successively, and the antiphlogistic plan was strictly enjoined till the symptoms of fever and irritation subsided.

On the 20th instant, three days after the operation, a degree of soreness and tension manifested itself in the lower part of the abdomen, which extended along the urethra, and which assumed the appearance of peritoneal inflammation. But, on a minute investigation I was convinced, that the tension of the abdomen was caused by the parts of the wound connected with the operation being distended with inflammation, which wholly prevented the action of the bladder and voluntary power of the abdominal muscles from propelling the urine* through the

* I am induced to believe, that ischuria vesicalis, subsequent to the operation of lithotomy, is a very rare occurrence, and, so far as my inquiry extends, is scarcely noticed by any authors who have written on the after-treatment of patients labouring under this disease, and it being a circumstance which may be occasionally mistaken for peritonitis, seeing the symptoms, on a superficial inspection, bear some analogy to each other. Hence will appear the necessity, in every instance of abdominal affection, for the surgeon minutely to investigate the state of the bladder, and witness the discharge of urine from the wound or by the urethra. By strict attention to this particular, the morbid retention of urine may be distinguished from abdominal inflam-

aperture. Without hesitation I passed a female catheter up the wound in perineo into the cavity of the bladder, and evacuated more than a quart of limpid urine of healthy appearance. This unusual mode of assisting nature in relieving herself, was found necessary to be repeated every eight or ten hours for several succeeding days, until the tension and inflammation of the parts connected with the wound had subsided; after which the urine returned through the artificial aperture with comparative freedom. About three weeks from the time of the operation, a little urine made its way, at intervals, by the channel of the urethra, and the man seemed gradually recovering; when on a sudden a new train of symptoms came on, accompanied with inflammation and swelling of the right testicle, attended with violent obtuse pain, which produced a slight degree of fever and constitutional irritation of the system. Ten leeches were applied to the inflamed scrotum, and cloths moistened in a solution of ammonia muriata in vinegar and water were kept constantly applied to the affected part; a brisk purgative draught was administered, and a scanty regimen enjoined: yet every precaution used to disperse the swelling and inflammation proved unavailing, and suppuration was announced by frequent rigours, and the stricture of the testicle becoming less tense. A poultice was then applied, and renewed three times a-day, till a fluctuation of matter became perceptible, which was let out through an opening made with a lancet; the part soon healed, and the tension of the testicle gradually subsided; soon after which the left testicle became enlarged and painful, and assumed the appearance of a smooth solid substance. Leeches and other topical applications were assiduously applied, as in the former affection, and a mixture, apparently of pus and urine, was regurgitated* by the urethra,

mation, and by the introduction of a female catheter through the wound into the bladder, the water may be discharged as often as required, and till the inflammation subsides, by which means the patient will be relieved; and by neglect of this mode of manual assistance, inflammation of the bladder and abdominal viscera would inevitably follow, for there is much reason for believing, that serious mistakes have sometimes ensued from this species of retention of urine.

* I conceive it is not easy to explain the real cause of this malady of the

which continued for the course of eight or ten days, and then the inflammation and swelling gradually disappeared. From this period the wound in perineo assumed a granulating and healthy appearance, and the urine was voided voluntarily through the urethra in increased quantity; and in the space of ten weeks, from the time of the operation, the wound was completely healed, and the man returned home in a state of apparent good health, being able to retain his urine in considerable quantity, and propel it at pleasure. On a minute examination of the state of the prostate gland at this period, by the finger in ano, its size appeared very much diminished from what it was prior to the operation.†

I have lately had an opportunity of conversing with my patient, and he informs me, that some weeks past he parted with two small pieces of rough calculi by the urethra, and there is a deposit of sabulous matter in his urine, from which it appears probable that the disposition to the formation of stone still exists.

testicles, nor do I find such an occurrence mentioned by writers on lithotomy: however, I will hazard a conjecture, that in all probability some irregular particles of calculi, separated from the urine, might become entangled behind the veru montanum, and obliterate the orifices of the seminal ducts, and in this way produce irritation of the contiguous parts, or by sympathy the vas deferens might participate therewith, and the inflammation be communicated to the testis; for it appears likely that the matter was regurgitated through this duct from the testicle to the urethra.

† I am inclined to believe, that if the gorget had been used in this case, it would not have divided more than half of the left portion of the prostate gland, consequently the incision must have been quite inadequate for the extraction of the stone, and probably too small to admit the blades of the forceps without much violence; and owing to the indurated structure of the gland opposing such a degree of resistance to its introduction into the bladder, it is more than propable that, during the attempt to accomplish this step of the operation, the prostate gland must have been severed from its connection with the membranous portion of the urethra, and the posterior part of the bladder become transfixed.

On Painful Subcutaneous Tubercle.

By William Wood, Esq. Member of the Royal College of Surgeons, Edinburgh.

[From the Edinburgh Medical and Surgical Journal, for July 1812.]

The disease which forms the subject of the present communication has not, so far as I know, been mentioned in the writings of any systematical or practical author, although it is not a very unfrequent occurrence, if I may judge from the number of cases which I have had an opportunity of seeing within the last twelve months. It appears to me to be well worthy of attention, both from the severe suffering which it causes to the patient, and from the singularity of the symptoms to which it gives rise.

The disease to which I allude, consists in the formation of a lump or tubercle, of a peculiar nature, in the subcutaneous cellular substance. This tubercle is met with in different parts of the body, but most frequently in the extremities. It is extremely small, generally of the size and form of a flattened garden-pea; and in none of the cases of which I have been able to procure a distinct account, larger than a coffee-bean. It is of a firm consistence, and is apparently quite circumscribed, being situated loosely in the cellular substance, immediately under the integuments, which retain their natural colour and appearance.

In the greater proportion of cases, there is no visible appearance of disease whatever, and it is only when the surgeon applies his finger to a particular spot pointed out by the patient, that he becomes sensible of the existence of the tubercle. In some few cases, however, although small, it is so superficially seated as to form a visible prominence.

As in all the cases with which I am acquainted, the tubercle had attained nearly its full growth before its presence was detected, I am unable to say, whether it is originally of slow or of rapid formation; but having acquired a certain size, it remains nearly stationary, undergoing hardly any perceptible increase of bulk, even in the course of a great many years; nor

does it ever show any tendency to affect either the skin or surrounding cellular substance. In one only of the patients whom I have seen, or of whose disease I have procured an account, has there been found more than one of these tubercles, and in that person there were present no fewer than three at the same time.

Trifling as the diseased part is, in point of size and appearance, it becomes the cause of very severe and even excruciating pain. So strongly is this pain represented by the patients, that we might be apt to imagine their statement exaggerated, did we not find them all concurring in the same representation, and most of them willing to submit to any operation that may be necessary to remove the cause of their pain. Two women in the lower rank of life came to me, even from a distance of above thirty miles, to have a consultation about this disease, and both of them expressed their willingness to submit to any temporary pain, however severe, which might remove their complaint.

The pain to which this disease gives rise, is extremely acute in the tubercle, and extends from it to a considerable distance along the neighbouring parts; it is not constant, but occurs in paroxysms. In general, at the commencement of the paroxysm, the pain is slight, but gradually increases till it becomes excruciatingly severe, and it goes off in the same gradual manner, leaving the parts in the neighbourhood of the tubercle, for some time afterwards, sore to the touch, as if they had been bruised. The paroxysms vary in duration from ten minutes to upwards of two hours; but they seem to increase both in frequency and severity, in proportion to the length of time the disease has existed.

Some of the patients have occasional intervals of ease for days or even weeks; in others the paroxysms occur several times in the course of one day. They generally come on spontaneously; but in one of the cases which I met with, they were sometimes induced by the friction of the clothes along the surface of the tubercle. They frequently attack the patient when asleep, in which case he is suddenly awoke by the severity of the pain.

The degree of pain produced by touching the tubercle is

different in different cases; all the patients whom I have examined allowing it to be freely handled, *in its ordinary state*, without feeling much uneasiness, but complaining of great aggravation of the pain, from either the tubercle or surrounding skin being even slightly touched *during the paroxysm.* Acute pain is produced at all times, by the tubercle being accidentally struck against any hard substance. One lady, of whose case I shall give a detailed account, conceives that the sensibility of the tubercle is materially affected by every change in the weather; whether from heat to cold, or from cold to heat. Several of the patients have stated, that they are sensible of an increase in the size of the tubercle *during the attack of pain,* and some of them have occasionally observed, at the same time, a degree of discoloration of the skin covering it, which became of a purplish or bluish cast; and although I have had no opportunity of ascertaining the truth of these statements from my own observation, I have no reason to doubt their accuracy.

It is a singular circumstance, that in all the cases which have come to my knowledge, with perhaps one exception, this species of tubercle occurred in females. It does not appear to be confined to any particular age, but it is frequently met with at an early period of life, and I have known it remain nearly unchanged for upwards of eighteen years.

From the very severe and almost constant suffering to which the patient is exposed, the tubercle frequently becomes the subject of operation, and fortunately it may be extirpated with perfect safety, no unpleasant symptom having ever, so far as I know, been produced by the operation. The patient becomes free from all pain and uneasiness as soon as the tubercle is removed, and, so far as experience yet goes, there seems to be no tendency to a return of the disease. In removing the tubercle, it is found to be quite detached from the integuments, and to be but loosely connected with the surrounding cellular substance, both of which are, to all appearance, perfectly sound. From this circumstance it is unnecessary to take away any portion of the skin, and only a very inconsiderable quantity of the cellular membrane. The wound frequently heals by the first intention, and, even in those cases in which suppuration

takes place, the cure is seldom prolonged for any considerable length of time. On dividing the tubercle with the knife, after it has been removed from the body, it is found to be of a pretty firm consistence, and it exhibits a uniform structure, somewhat resembling cartilage in appearance, but it is by no means so hard.

I shall now proceed to give a detailed account of the cases, from which the above history of the disease has been drawn up.

Case I.—Miss ———, a lady of about 30 years of age, consulted my father in th year 1809, on account of three tubercles, rather smaller than garden-peas, situated superficially under the integuments over the upper part of the gluteus maximus muscle. These were placed pretty near each other; they were quite movable, and the skin covering them was of its natural colour and appearance. She complained of frequent attacks of extremely acute pain in these little tumours, which extended from them to a considerable distance along the neighbouring parts. These attacks, sometimes occurred spontaneously, but were frequently also brought on by the friction of her clothes along the tubercles. She was recommended to try the topical application of mercurial ointment, but this not being productive of any relief, she most anxiously desired the removal of the diseased parts. The three tubercles, along with a considerable portion of the integuments and of the cellular substance, were removed by my father, by two incisions. The wound healed by the first intention, and the lady has never since had any uneasiness or return of her disease.

Case II.—Betty Hunter, a poor woman, above seventy years of age, came in autumn last, from a distance of above thirty miles, to have a consultation about a small tubercle of the size and form of a flattened garden-pea, situated superficially under the skin, a little above the inner side of the right knee. There was no visible appearance of disease on looking at the affected limb; the skin was of natural colour and appearance. The tubercle was quite circumscribed and very movable. When she applied to me for advice, she said it would appear strange that a woman, at her time of life, should have come

such a distance, on account of what would appear to me a perfect trifle, but that trifling as the little knot might appear, it rendered her life miserable, from the excessive pain to which it gave rise; and she added, that she would submit most willingly to any operation I might propose, that would remove her disease. She informed me that it was upwards of eighteen years since she first observed the little lump, and there was hardly any perceptible increase in its size since that time,—that it had not given her a great deal of uneasiness till within eighteen months, at which time she had become subject to occasional attacks of severe pain in the tubercle, extending from it to a considerable distance along the thigh and leg; that, for some time back, she had had regularly one paroxysm in the course of every twenty-four hours, which came on sometimes during the day, and at others during the night; that these paroxysms originally continued for about half an hour, but had gradually increased to upwards of an hour and a half, and had become excruciatingly severe. She enjoyed perfect ease in the intervals between the paroxysms. She never perceived, at any time, any alteration in the colour or appearance of the skin. She allowed the tumour to be freely handled, without complaining of much uneasiness.

Having pinched up the tubercle, I cut it out, along with a portion of the integuments, and afterwards removed a quantity of the contiguous cellular membrane. Partly from having removed so much of the cellular substance, and probably in part from the languor of the circulation at her advanced period of life, adhesion did not take place, and the wound assumed an indolent appearance. By means of poultices, however, and stimulating applications, it was brought into a state of suppuration, and was healed up in the course of 15 or 16 days. The skin and cellular substance which I had removed, were, on examination, found to all appearance perfectly sound. She has had no return of her disease.

Case III.—Mrs. Craig, about 28 years of age, came to me in March last, from a considerable distance in Fife, on account of a tubercle of the size and form of a flattened garden pea, situated immediately under the skin over the middle of

the right leg, on its outer side. It felt firm but movable, and the skin retained its natural colour and appearance. Above seven years previous to my seeing her, she had become subject to frequent attacks of pain in the right leg, and soon afterwards she accidentally discovered the little knot, which had undergone very little alteration in size from that time. For several years back she had been subject to several paroxysms of pain in the course of every 24 hours, varying in duration from ten minutes to nearly three quarters of an hour; these she said had become exquisitely severe; they frequently attacked her when asleep, in which case she suddenly awoke in a fright, and occasionally found that she was screaming out from the severity of the pain. The pain was not confined to the tubercle, but extended to some distance both up and down the leg. By her account, the tubercle frequently became *visibly increased in size during the paroxysm*, and the skin covering it, sometimes at the same time, assumed a purplish or bluish hue. The paroxysms had been gradually increasing both in frequency and severity. I removed the tubercle, without taking away any part of the integuments, and a very small portion only of cellular substance. At the first removal of the adhesive straps the divided parts were found to have adhered, but there was a slight discharge of pus from the surface of the wound for ten or twelve days. She has not experienced the slightest uneasiness since the operation.

Case IV.—Mrs. ——, a lady of about 50 years of age, more than twelve years ago, became subject to frequent attacks of pain in the right arm, which were supposed to arise from rheumatism. On this account blisters and other remedies were employed, but without any advantage. Some years afterwards she accidentally discovered a small lump, about the size of a small garden-pea, under the skin, on the middle and outer part of the right arm. At this time the attacks of pain were frequent; the pain was very acute, both in the tubercle, and in the surrounding parts upwards nearly to the shoulder, and downwards to the fingers; these parts felt sore to the touch for some time after the paroxysm had gone off; she occasionally also felt a degree of numbness in the fingers of the right hand.

She was ordered the topical use of mercurial ointment, but was at the same time recommended, if she did not soon get free of pain, to have the diseased part cut out. She conceived that she derived some advantage from the ointment; at least after its employment, the pain no longer extended downwards towards the hand, although it remained equally severe in the tubercle itself, and in the upper part of the arm. I saw this lady a few days ago; she informs me that she is never 24 hours free from an attack of pain, which lasts from half an hour to nearly an hour; that it is slight at the commencement of the paroxysm, but gradually increases until it becomes excessively severe, and after it has begun to abate it goes off gradually. The pain, during the paroxysm, extends a good way up the arm, which remains sore to the touch for some time afterwards. Although she complains of no uneasiness on the tubercle's being freely handled, *in its ordinary state*, exquisite pain is the consequence of either the tubercle or surrounding skin being touched even in the slightest manner, *during the paroxysm*. She says she does not think it possible for any person who has not experienced the pain of this disease to form any idea of its severity. The paroxysms frequently awake her from sleep. There is no visible appearance of disease on looking at the arm, but when the particular spot is pointed out, a tubercle a little larger than a flattened garden-pea, and more of an oval form, is felt rolling very superficially under the integuments, which she has never observed to undergo any change in colour or appearance. She thinks the tubercle a little larger than when she first perceived it; she informs me that it appears to her to be increased in size *during the paroxysm*, or at least that it becomes, at that time, more superficial than usual, although never visibly prominent.

These are the only cases of the disease which I have met with in private practice. I had an opportunity, however, of seeing another case in the Royal Infirmary in the course of last summer. The patient was under the care of my friend, Mr. Newbigging, one of the surgeons to that institution, with whose permission I insert the history of the case.

Case V.—"MARGARET OLIVER, ætat. 29. June 20th

1811. About the middle of the left leg, over the gastrocnemius externus muscle, is a small movable tumour, about the size and shape of a garden-pea flattened, and of a firm consistence. It is situated immediately below the integuments, which are not in the least discoloured. She describes the pain as shooting from the part to the knee and upwards, at times so exquisite that she can scarcely bear it, particularly when the limb is cold, and has remained for some time at rest; it is always relieved by rubbing the part, and by the application of heat; says, that during the summer months she scarcely ever feels it, and her walking is not the least impeded by it. Her general health has been rather indifferent for some years past, which she ascribes to her rest in the fore part of the night, during the winter months, being so frequently interrupted by the pain of the limb. When she first felt it, which is between ten and twelve years ago, the knot was about the size of a pin's head; since then it has been slowly and gradually increasing. Knows no cause for the complaint, and has used no remedies except fomenting the part with vinegar about two years ago, which procured no relief.

"June 22.—The tumour was removed to-day; which on examination was found to be about the size and shape of a garden-pea, of a hard uniform texture, and resembling cartilage. The part was dressed with strap and bandage.

"June 24.—Last night the straps were removed on account of the pain they occasioned. The edges of the wound had become inflamed, swelled, and matter had begun to be secreted. An emollient poultice was applied.

"June 30.—Had for two days slight febrile symptoms, which are now gone; leg is looking better; inflammation gone.

"July 2.—Dismissed cured."

These five are all the cases in which I have had an opportunity of seeing the patient, and examining the diseased part; but being anxious to give as full and accurate account as possible of the symptoms and progress of this singular species of tubercle, I applied to my medical friends for information on the subject, and two of them, Professor Thomson and Mr. Newbigging, have been kind enough to favour me with a very distinct account of the disease, as it occurred in patients who

had come under their care in private practice. Cases VI. and VII. were drawn up for me by Professor Thomson, and case VIII. by Mr. Newbigging.

Case VI.—"Mrs. A. a lady of about 33 years of age, consulted me several years ago, on account of a small tubercle under the skin, on the middle and outer part of the left fore-arm. It was about the size of a small pea, was movable, and in general without pain. At times, however, it was so exquisitely painful, that she said she was unable to endure it. The attacks of pain came on chiefly in the night-time, and deprived her often of her sleep. The pain at these times extended downwards to the fingers, and upwards to the shoulder. I advised extirpation, which was accordingly done, but had no opportunity of afterwards examining the structure of the tubercle. This lady has ever since continued free from pain.

Case VII.—"Mrs. C. a particular friend of mine, about 57 years of age, has a small tubercle about the size of a coffee-bean, situated immediately under and now attached to the skin on the inside of the calf of the right leg. This tubercle is in general without pain, though at times it becomes exquisitely painful. It began about ten years ago, soon after she happened, by a violent effort, to rupture some of the fibres of the gastrocnemius muscle of the leg, near to the place where it is situated. This lady always feels pain in the tubercle for some time before and after changes of weather take place, whether these changes be from heat to cold or from cold to heat. During the periods of pain, which often last for some days, the skin surrounding the tubercle becomes exquisitely sensible to a considerable distance from it; the veins of the leg swell, and the tubercle itself has a slight blush of red. I have repeatedly advised extirpation, but have not been able to prevail on her to submit to it.

Case VIII.—"A married lady, about 40 years of age, had a small movable tumour about the size of a garden-pea, upon the outside of the right arm, a little above the elbow, seated immediately below the skin. She complained of frequent at-

tacks of severe pain in the tumour, shooting to the points of the fingers, and to the shoulders. The duration of these attacks varied much, but they seldom lasted for a shorter time than three or four hours, and sometimes the pain was little absent for several days together. The intervals between the paroxysms also varied much, being sometimes a week or ten days, and at others not more than 24 hours. She remarked that, although the skin was of its natural appearance, and not at all elevated, *during the intervals of ease*, yet it assumed a blue or purplish colour, and was visibly elevated by the tumour during *the fit of pain*. She was not aware of any cause which excited the paroxysm, but during its presence the suffering was much increased by the tumour being touched. Her attention was first drawn to the existence of the tumour, ten years ago, by the pain, which then resembled the sensation as if the part had been pricked by a needle. The paroxysms were at that time slight and rare, but in a short time they became more severe, and occurred nearly in the same degree for the last six or eight years. She remarked no change in the size of the tumour from the time she first observed it, till it was cut out about a year ago. The wound healed readily, and she has not had the slightest uneasiness since the operation."

It will be remarked, that in all these eight cases, this disease occurred in females. In addition to them, however, I have to mention, that my friend Mr. Gillespie informs me, that several years ago he had an old man under his care, in Gillespie's hospital, who had a small tumour under the skin of one of his cheeks, rather larger than a coffee-bean; that he remembers his occasionally complaining of very severe pain in it, which extended towards the eye and ear; that the pain sometimes left him entirely for several weeks, after which it would return in severe attacks, lasting with little intermission for several days. This man imagined the tumour to be enlarged during the continuance of the pain. These are all the particulars of his complaint which I have been able to procure, as Mr. Gillespie had not kept any notes of it. I think, however, from this account, there can be little doubt that it was of the same nature with the disease which I have just described, and which, for want of a better name, I have denominated *painful subcutaneous tubercle*.

Case of Epilepsy reduced to a regular periodical Form by a new Method, and cured under that Form by the Administration of Cinchona.

Read at the Sitting of the First Class of the Institute, the 5th of November, 1810, by M. DUMAS, Dean of the Faculty of Medicine of Montpelier, Professor of Physiology. &c.

[From the New Medical and Physical Journal, for March 1812.]

IT has long been generally known, and we have seen it confirmed by daily experience, that most obstinate chronic diseases may sometimes be changed into milder affections, and that this change is frequently sufficient for the complete removal of the disease. We are still ignorant, however, to what extent this principle may be applied. Very beneficial results may be obtained by reducing chronic diseases to the most simple form, such as a periodic or nervous affection, which may almost always be made to yield to the powers of medicine. The following case presents us with an instance of an irregular epilepsy changed into a periodical epilepsy, and becoming easily curable in this new form.

The efficacy of cinchona, in all diseases consisting of regular periodical paroxysms, is placed beyond all doubt: whatever may be the nature of chronic diseases, they seldom resist the curative action of this medicine, if the character of periodical accession is well marked. We have only therefore, by an appropriate method, to reduce epilepsy into a periodic form, similar to intermittent fevers; because, we possess a *specific* for these fevers as well as for all diseases in which periodic returns form an essential part.

During my stay at Bordeaux, in the year 1806, I was consulted by a young epileptic patient, whose history was rather remarkable. He was about 23 years of age, of a bilious temperament, strong irritable constitution, and of extreme sensibility. The affection of his nervous system had been derived from his parents; his mother was subject to frequent hysteric attacks; and his father had been troubled with spasms in the stomach and chest every month, until the establishment of an hæmorrhoidal flux in his 48th year had relieved him from them. The same nervous disposition was manifested during the infancy of my patient, by convulsive movements which took place

without any apparent cause, and also by his having been attacked three different times with an intermittent fever, which was removed by combining antispasmodics with cinchona. About the age of sixteen years, he was attacked with convulsions, which soon put on the appearance of epilepsy. In the intervals of the attacks he was subject to symptoms of lowness and vapours; very slight causes would excite the strongest emotions in him. He generally complained of an unpleasant sensation in the head and in the epigastric region, accompanied with spasms, dread, vertigo, sense of suffocation, watchfulness, &c. Flushing of the face, swelling of the eye-lids, heat and itching in the nostrils, and an eruption of pustules about the lips, were commonly the harbingers of a new attack. These attacks were at first irregular, generally produced by some accidental causes, as a fit of anger, an error in diet, or a strong emotion of mind. It was always observed that spirituous liquors, and especially the smallest quantity of punch, invariably brought on a fit of epilepsy. At the beginning the attacks were seldom, and did not observe any fixed periods of return. Previous to his 18th year the patient had not had more than seven or eight short fits, for which he had made use of baths, cooling medicines, antispasmodics, and spare diet. At this period the epilepsy, which had existed for two years, shewed itself under a real periodical form, and the patient had, during five or six months, a regular attack every fifteen or twenty days. These attacks did not appear at all to correspond with the changes of the moon.

This periodical form of the disease deserved attention, and ought to have influenced the treatment of it; it was, however, neglected, and instead of opposing the epileptic affection in a similar way with other intermitting diseases, by giving cinchona, the opportunity was lost, and only some empirical medicines were given. Three eminent physicians of Bordeaux were called to see the patient; they proposed to combine some antispasmodics with bitter tonics, the use of which diminished the number and violence of the paroxysms. Valerian, flowers of zinc, rhubarb and cinchona were given in combination. Had they given the cinchona alone in proper doses, the patient would have been cured.

The disease now ceased to be periodical, it recurred only at

very long intervals; seven or eight attacks took place in about sixteen months. The patient approached his 20th year, the age of the passions, and he gave himself up to them; he had a propensity to indulge in spirituous liquors, but their use brought on severe attacks of the disease. Punch, particularly, always brought on an epileptic paroxysm. The intervals between the attacks shortened, and the paroxysms at length became very frequent. After his 21st year, the patient generally had three or four in a month; sometimes he would have several in the same day. He was in this unhappy situation in 1806, when I saw and prescribed for him. An attentive examination of the case, led me to adopt two general principles, or elementary causes of this epileptic affection; the first, an hereditary nervous predisposition; and the other, a confirmed habitude of sanguineous and catarrhal determination towards the head. I therefore proposed a treatment conformable to these two principles, and which consisted in the administration of refrigerants, direct antispasmodics and revellents. Mucilaginous drinks, nitric lemonade, warm baths, frictions, camphor, assafœtida, orange leaves, pediluvia, repeated applications of leeches and blisters were the means I recommended to fulfil the two-fold indication. The treatment was to conclude with bitter and stomachic tonics to remove the geneal weakness of the constitution, and that of the abdominal viscera in particular.

This plan was followed with great regularity and punctuality, but without success; no alteration was produced in the disease; its attacks were neither less strong nor less frequent. Being again consulted I prescribed tonics, and particularly cinchona. The number and violence of the attacks were not in the least diminished by it. I then thought of trying a new method of treatment, which I was led to adopt by inductions and analogies drawn from the phenomena of the disease. I wished to convert it into a periodic epilepsy, and to cure it in the same manner as an intermittent fever. Several circumstances in the case seemed favourable to my views, which were also justifiable by the examples of chronic affections, wherein Nature works analogous changes. The indications and motives for this attempt will appear from the following considerations.

1. The eminently nervous constitution of the patient, which rendered him susceptible of periodic and intermittent diseases;

since intermission is a general law, which the immediate functions of the nervous system always obey, both in a state of health and a state of disease.

2. The intermittent fevers, to which he had been subject in his childhood, indicated a singular aptitude in him for this determined form of disease. There was reason to think, that as Nature had shown this disposition, it might be possible to establish the intermitting and periodic type in the existing disease.

3. This epilepsy presented all the characters of nervous affections, which have great affinity with intermittent and periodic diseases.

4 The fixed and regular attacks which occurred every fifteen or twenty days, when the patient was about 18 years old, indicated a sort of tendency to periods, which might be developed by art.

5. Spirituous liquors, particularly punch, possessed the power of bringing on paroxysms, and consequently furnished the means of producing them at pleasure.

Upon these circumstances, I founded the hope of bringing the dieases to a periodic form; I was certain of regularly producing paroxysms on determined days, by giving the patient spirituous liquors. Nothing was wanted but thus to produce the paroxysms sufficiently often to establish the habit of their returning at the fixed periods. The greatest difficulty was in deciding on what days there was the most probability of the paroxysms returning; I calculated in the following manner. An exact account had been kept of all the attacks of the disease. I found that the number of attacks in a year amounted to twenty-nine or thirty; dividing these into equal portions, it gave twelve or thirteen days for each of the intervals. I concluded then that this epilepsy would, if periodical, recur at the end of every twelve days; I therefore proposed to bring on a paroxysm every twelve days, for I thought this period the most favourable to their reproduction. I was confirmed in my preference for the period of twelve days by a curious circumstance, which had, at first, escaped my notice. The attacks of the disease had been stronger and more frequent during the last twenty months than before; but commencing from the first attack, the twelfth day, or its equal fractions, or its products when multiplied, were

the periods when the disease principally recurred. Thus I perceived that he often had one, two, or even three attacks on the twelfth day, afterwards on the sixth, and then on the third in the short intervals; when the intervals were long, the disease recurred on the twenty-fourth or the thirty-sixth day. The choice of the day for the production of the paroxysm, could be no more than conjectural; the circumstances I have stated, however, induced me to fix upon the interval of twelve days. It is possible that I might have equally succeeded by fixing on some other interval. It only remained for me to put in practice the means I possessed of producing the epilepsy in the patient.

I ordered him to take a certain quantity of punch, and thereby to produce a paroxysm every 12 days. At the same time, I endeavoured to prevent any attacks in the intervals, and directed some medicines proper for the purpose. For instance, there was always kept ready a composition of sulphuric ether, camphor, and assafœtida, to be given him on the least appearance of an attack; all the exciting causes were avoided, his diet was more mild and light than usual; amusements, journeys, the country air, bathing, pediluvia, and dry frictions were recommended to keep off the attack on the intermediate days. This treatment had a speedy and more happy effect than I could have hoped for; several attacks took place with an interval of twelve days, without any intermediate attack, or any inconvenience whatever. The quantity of punch given each time was gradually diminished, and the epilepsy still returned with the same regularity. At the end of three months, the punch was totally suppressed, and the disease still kept its regular periods. The periodical character became the essential and predominant affection. I then treated the disease as if it had been really an intermittent. I prescribed the bark during the intermission. The patient took half an ounce of cinchona the day after the attack, consequently, at the greatest distance from the next accession; he repeated this quantity for the first five days; the quantity was then reduced to two drachms daily until the twelfth day, when he took an ounce a few hours before the expected attack; to the cinchona was now added a little sulphuric ether and liquid laudanum. By these means, the force and duration of the paroxysms were diminished; and the patient felt a

degree of health and strength in the intervals, which he had not done before. At length, in place of a paroxysm, he had only slight vertigo, accompanied with contraction of the upper extremities. This vertigo in its turn ceased, and the disease completely disappeared. The patient has not experienced any return during the last two years. Nevertheless, I advise the bark to be taken occasionally, at those periods of the year, which precede the changes produced by the order of the seasons.

I do not recollect any instance of a patient being treated in a similar way; but the possibility of establishing a general method of treatment, applicable to the whole family of chronic diseases, may be deduced from many analogous facts: we have seen the most severe diseases, even those reputed incurable, leave the patient, after having changed their form into one more simple, either by the efforts of Nature, or the powers of medicine. The works of Medicus, Rhan, and some other French physicians, who have contended for the identity of all periodical affections, contain examples of chronic diseases, not at first in a periodical form, afterwards becoming so, and then giving way to the cinchona. It is well known at present, that the most obstinate chronic diseases may be cured by those means which are capable of bringing on a fever; that is to say, by reducing diseases to a febrile state, which did not before partake of the nature of fever.

The singular property which the punch and spirituous liquors possessed of bringing on paroxysms of this epilepsy, was one among the general effects of stimulants, which, by their application, are capable of producing an accession of nervous affections. Tissot relates, that he knew two nervous persons, who constantly experienced an attack of their disease, one by the impression of moist air, and the other by the impression of a dry air. Among the number of facts recorded concerning medical electricity, I recollect to have read of some persons, in whom the action of this fluid, whether natural or artificial, always brought on an attack of convulsions. I have seen the same susceptibility of electric excitation in an hysteric female, in whom the sparks constantly produced a paroxysm. These different methods, might undoubtedly be employed to induce periodically and at pleasure, a return of those diseases excited by them. But instead of confirming by cases taken from others,

the efficacy of this treatment, of which experience has shown me the advantages, I shall endeavour to reduce to a few fundamental principles, the immediate results of so remarkable a fact in the practice of medicine.

1. As nature sometimes changes the most severe and obstinate disease into more simple and curable affections, it may be possible for art to produce the same change, and thereby to render diseases capable of being more easily and completely cured.

2. The formation of chronic diseases must depend upon several different dispositions, which constitute their principles or elements. It is of consequence, therefore, to render predominant such one of these dispositions as is best understood by us, and against which we possess an effectual method of cure.

3. The periodical form is a determined condition of chronic diseases, whose character is best understood by us, and against which we are in possession of an efficacious and indeed specific treatment in the administration of the cinchona. It would, therefore, be highly advantageous to induce a periodical form in all chronic diseases little understood, and whose cure is difficult and protracted.

4. A chronic disease, as epilepsy, may be more easily brought to a certain form or new and favourable disposition, when this disposition has been shown in the course of the disease, or appears to belong to the constitution of the patient.

5. We have the power of producing the periodic form, and rendering it predominant in diseases, by applying, on certain determined days, means capable of constantly exciting an accession of the disease. This application will be almost infallible, if it has been shown by experience that the means employed have a particular aptitude to produce attacks of this kind.

6. The periods to be fixed upon as the most suitable for the production of these attacks, must be determined by a kind of calculation of the greater or less probability of the paroxysms returning spontaneously at those periods. Thus, having found the number of attacks in a given space of time, it must be divided into equal intervals, as if they had taken place periodically, and then we must fix upon those days on which they would have returned had the intervals really been equal.

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SELECTED REVIEWS.

An Inquiry into the Changes induced on Atmospheric Air, by the Germination of Seeds, the Vegetation of Plants, and the Respiration of Animals. By Daniel Ellis. 8vo. pp. 246. Edinburgh and London. 1807.

Further Inquiries into the Changes induced on Atmospheric Air, &c. &c. By the same. 8vo. pp. 375. Edinburgh and London. 1811.

[From the Edinburgh Review, for November 1811.]

IN every stage of our inquiries into the properties of surrounding bodies, there is a certain portion of truth, which it is always in our power, by minute and accurate observation, to acquire; and when we have acquired this, our knowledge of the particular subjects investigated may be considered as complete; at least till new instruments or methods of investigation shall bring new phenomena within the sphere of our observation.

But if, on the one hand, it is only by full and correct observation, that we are led to the discovery of permanent truth, so, on the other, it will be found, that error of every kind is invariably referable to observation that is careless and imperfect. Thus it is, that, in the investigation of causes, some phenomena are occasionally overlooked which materially influence a result, and others admitted as essential to it, with which it is in no respect connected; that analogies and resemblances are sometimes conceived to exist between events, which are in truth extremely dissimilar; and that the wildest flights of fancy are sometimes permitted to occupy the place of those rational and legitimate hypotheses, which, if they are not the immediate anticipations of truth, are at least highly instrumental towards its discovery.

Obvious as these remarks undoubtedly are, we fear that the class of inquirers who are chiefly interested in the work before us, have but too seldom been fully aware of their importance. The science of Physiology—regarding it, in its widest extent, as that which treats of the functions or properties of animals

and vegetables—has always attracted a considerable share of attention; and yet there is none which has at all times abounded in so much extravagant theory. Even at the present day, we believe that there is no branch of knowledge more imperfect; nor any which, amidst a great, though slowly accumulated mass of curious and important truths, still retains so large a proportion of what is vague, fanciful, and erroneous.

It would not perhaps have been uninteresting, to have endeavoured to point out at length the causes which seem to have subjected this science in particular to such an imputation: but, for the present, we must content ourselves with observing, that we believe they may all be reduced nearly to the following:—That the various departments of the science have hitherto been considered in a manner too unconnected and irregular; and have been too little cultivated by persons capable of devoting an undivided attention to their investigation, and of studying all the functions of life in their actual connexion with each other. It is unfortunate, too, that Physiology has been regarded as the peculiar province of persons connected with the profession of medicine; for the most able and intelligent individuals of this class do not always cherish a partiality for physiological inquiries; or, if they do possess any taste for such pursuits, they are usually prevented from prosecuting them with success, by the labor or multiplicity of their practical duties. The truth indeed is, that, in the vast variety of phenomena exhibited by organized beings, anatomists, physicians, metaphysicians, chemists, opticians, and mechanical philosophers, have all found ample field for occasional investigation. Each have selected, for separate speculation or inquiry, those subjects which were most conformable with their habitual studies or occupations. To their talents and industry Physiology is indebted for a large share of the established truth of which it has to boast; but, at the same time, we are obliged to impute to the partial views of these very men, the greater proportion of the error with which it abounds.

If any thing, however, can contribute to render an imperfect science speedily perfect, it is the publication of inquiries conducted on the plan of those which form the subject of the present article. We scarcely know any work in physiology,

where an author has displayed a more extensive knowledge of every fact contributing, in the most remote manner, to elucidate the object of his investigation; in which, he has sought the opinions of others with more diligence, or stated them with more uniform candour; or where he has himself interrogated Nature, by experiments more judicious or more successful.

It is a fact, which has been long sufficiently known, that every thing which lives, whether animal or vegetable, requires, for the continuance of its life, a constant supply of fresh air. The great purpose of Mr. Ellis's Inquiry, is to discover why it is that air is necessary to the vital existence of organized bodies. In the present volumes, he has particularly in view, to show the precise nature of the changes which the air suffers, from the action of animals and vegetables upon it; and in what manner those changes are effected. The original 'Inquiry' was published in 1807; but the author has since that time, not only been led, in obviating the very few objections which have been urged to his doctrines, to the discovery of some new and interesting facts, but has corrected his original views by various additional experiments. The result of the whole we shall endeavour to lay before our readers in as few and as plain words as possible.

In the human body, from the first to the last moments of its existence, we remark, that a certain quantity of air is alternately rushing into and out of the mouth and nostrils. The chest, or thorax, is so constructed, that, merely from the elasticity of its sides, and the pressure of the surrounding parts upon them, it has a tendency to assume a certain permanent capacity or dilatation. Accordingly, after death, when there no longer exists any counteracting cause, this is the capacity which it assumes and retains. We may call it the natural state of the thorax. In the living body, however, it is found that, by the action of the surrounding muscles, a further enlargement of the chest, beyond its natural state, may be produced. As soon as this dilatation commences, it is obvious that a sort of *vacuum* must be formed between the sides of the thorax and the lungs. A current of air, therefore, immediately flows through the windpipe into the air-cells of the lungs, and

gradually distends these organs, in proportion as the cavity containing them is increased. This constitutes what is denominated Inspiration. The quantity of air which is inhaled, in any single inspiration, is of course determined entirely by the extent to which the chest is dilated. In individuals who are healthy and at rest, inspiration consists merely of a gentle enlargement, produced by a partial contraction of the diaphragm; and such may be termed an Ordinary Inspiration. The quantity of air, which rushes into the lungs during an inspiration of this kind, is very different in different individuals, according to the size of their chests, or the extent to which the diaphragm contracts, in the inspirations of each. It has been variously estimated, in adults of a middle stature, at 13, 17, 20, 35, and 40 cubic inches; affording 25 cubic inches as a mean. But all these calculations have not been founded on equally satisfactory *data*. Dr. Menzies's experiments alone, which estimate the average bulk of an ordinary inspiration at about 40 cubic inches, seem to have been performed in an unexceptionable manner: and we place the more confidence in his calculation, that we have found it to correspond with some late experiments of our own. In larger inspirations, the thorax is increased in all directions; and the average bulk of air, at temperature 60 Fahrenheit, which is inhaled by the utmost possible inspiring effort, or by what may be called an extreme inspiration, is probably about 130 cubic inches.

After previous enlargement, the cavity of the thorax may be diminished by the pressure of the abdominal viscera, the elasticity of the parts with which the ribs are connected, and the muscles which pull these bones downwards, exactly to its natural capacity, or even considerably below it. When the diminution commences, the lungs are compressed; and the air, being thus forced out of their cells, escapes by the trachea and mouth. This constitutes Expiration. In health, and during rest, it consists of a reduction of the thorax to its natural state only; and this seems produced merely by the compression of the relaxed diaphragm, and the elasticity of the cartilages and softer parts affixed to the ribs: consequently, the quantity of air expelled is exactly equal to the quantity previously inhaled. Such may be called an Ordinary Expiration. In all larger

expirations, where the chest is compressed below its natural state, the compression is produced and sustained entirely by the action of powerful muscles, drawing down the ribs, and forcing the diaphragm upwards; and, as soon as these muscles cease to act, the thorax returns to its natural state again. We are inclined to think, from experiment, that the quantity of air which, on an average, is expelled by an extreme expiration, after a previous extreme inspiration, is about 260 cubic inches. It is to be remembered, however, that we cannot, by any muscular effort whatever, reduce the dimensions of the chest so far, as to empty the lungs entirely of their contents. After the most violent expiration, a considerable quantity of air still remains within their cells; nay, it is found extremely difficult to expel this residual air altogether, even by subjecting the lungs to very great compression, after they have been removed from the body. That, after an extreme expiration, they still retain, on an average, about 40 cubic inches, seems probable, from considering both the structure of the lungs, and the extent to which the thorax seems capable of being diminished by muscular action, as well as the result of an experiment of Mr. Davy.

These two processes, of inspiration, and expiration, generally alternate with each other, while the body is at rest, about 20 times in a minute. If therefore, we adopt 40 cubic inches, as the average bulk of air inhaled and exhaled, it will follow, that a full grown person respires 48,000 cubic inches in an hour, or 1,152,000 cubic inches in the course of a day; a quantity equal to about 79 hogsheads.

It has been long ascertained, however, that the air which is emitted by expiration, does not possess the same properties as that which has been inspired. Now, the only gaseous substances which chemists have hitherto found existing, permanently and uniformly, in the atmosphere, are oxygen, nitrogen, and carbonic acid; the relative properties of which may be judged of from the analysis of one cubic inch, which gives nearly $\frac{21}{100}$ of oxygen, and $\frac{79}{100}$ of nitrogen, with a quantity scarcely perceptible of the acid gas. What, then, is the precise nature of the changes which this atmospherical air undergoes, when it is received into the lungs?

That air which has been breathed is loaded with moisture, seems at all times to have been generally known. Upwards of fifty years ago, the celebrated Dr. Black demonstrated, that it was also combined with much more carbonic acid; and Dr. Priestley proved, in 1776, that it contained much less oxygen than the air inhaled. Yet, at the publication of Mr. Ellis's Inquiry, physiologists had not established, either the proportion of these gases existing in it, or the composition and quantity of the vapour with which it is united; nor had they ascertained what relation its nitrogen bore to that of the surrounding atmosphere. It appears, indeed, to have been the prevalent opinion, that a given quantity of atmospheric air, in passing once through the lungs, lost about $\frac{1}{68}$th part of its bulk of nitrogen, about $\frac{1}{10 \cdot 9}$th of oxygen, and gained nearly $\frac{1}{13}$th of carbonic acid; 100 cubic inches, for example, losing 1.47 cubic inches of nitrogen, and 9.117 cubic inches of oxygen; while they acquired 7.647 cubic inches of carbonic acid, by a single respiration. This conclusion was deduced chiefly from experiments performed by Mr. Davy; in which he found, that when he applied his mouth to a tube connected with a mercurial air-holder containing atmospheric air, and made a single inspiration and expiration from and into this vessel, as much in the manner of ordinary breathing as possible, the contents of the air-holder were diminished in bulk, and contained less nitrogen and oxygen, and more carbonic acid,—nearly in the proportions just stated. To the deductions which had been made from such experiments, in as far as they related to the disappearance of nitrogen, Mr. Ellis had objected, that they were such as the results obtained did not warrant; since there was no proof, that the chest was reduced exactly to the same capacity after as before the experiments; and we could not therefore infer, that the nitrogen gas which had disappeared from the air-holder was not to be found in the lungs. We wish he had extended this obvious and substantial objection, to the inferences which had been drawn from the same experiments regarding the proportions of oxygen and carbonic acid; for it appears in all respects equally applicable to them. If a small quantity of the nitrogen of the inspired air remained in the lungs, merely because the thorax was of larger dimensions

after than before the experiment, for the same reason a portion of oxygen, or carbonic acid, which otherwise would have been found in the air-holder, might have been retained in these organs.

Two memoirs on this subject, the joint production of Seguin and Lavoisier, were read to the Academy of Sciences of Paris, in 1789 and 1790; and Laplace has preserved the results of those experiments, in prosecution of the same inquiry, with which the philosopher last named was engaged when he was dragged to the guillotine;—experiments which he himself would have communicated to the world in detail, had not the short respite of a few days, which he requested for that purpose alone, been with such unprecedented barbarity denied. It would have been agreeable to us, if we could have attached any value to these investigations of two chemists so celebrated. But that caution which ought to be inseparable from every philosophical pursuit, precludes our placing the least reliance on results of experiments, when they are not detailed with the most circumstantial minuteness. We honour the memory of Lavoisier, and respect the talents of his surviving coadjutor. But their memoirs to which we have alluded, will hereafter be read, chiefly because they are among the last labours of one of the greatest philosophers of the eighteenth century. And, indeed, it is impossible to observe the tone of enthusiasm which these essays have in some parts received, from the prevailing spirit of the times in which they were written, without melancholy reflections—without feeling again awakened in us those emotions of deep regret with which the recollection of that period of disappointment must ever be contemplated.

As we never can be assured that the capacity of the lungs is the same after as before the experiment, we cannot decide, with certainty, how far the relative proportions of the gases in the air expired, may not have been influenced by this cause. But it is obvious, that if the diminution which may have been observed in the bulk of air by one inspiration, depended on any natural and constant process in the animal economy, by which air is continually abstracted from the cells of the lungs, the reduction in volume which would take place, in breathing a large quantity of air, would be directly proportional to the

number of respirations necessary to transmit the whole of this air through the lungs. Whereas, were it dependent on any such accidental circumstances as we have now alluded to, no such increase ought to be observed: the diminution might even be least, when the quantity of air inspired was largest; and, at all events, we should not expect to find it, in any instance, exceeding 20 cubic inches, or half the bulk of an ordinary inspiration. This point has been determined, in the most satisfactory manner, by the experiments of Messrs. Allen and Pepys. About three years ago, they constructed an apparatus, by which from 3000 to nearly 10,000 cubic inches of atmospheric air could be transmitted once through the lungs, by easy respirations, beginning and ending with a forced or extreme expiration: And, of thirteen experiments of this kind which they performed, the greatest deficiency in the expired air appeared in one where 3360 cubic inches had been inspired, in which it amounted to 62 cubic inches; in another, where 3620 cubic inches had been breathed, the diminution was only 4 cubic inches; and, in a third, 9890 cubic inches lost only 18. But, although it is thus established, that there is one cause to which the diminution is not owing, we do not feel ourselves entitled to assert, positively, that, in all these instances, it ought to be ascribed solely to the difference between the extent of the expiration immediately preceding, and of that closing the experiments. It may, hereafter, be shown to be dependent on circumstances entirely different. In the mean time, it may be remarked, that even the greatest deficiency in these experiments was not equal to half the difference between an ordinary and an extreme expiration.

When too large a volume of air is breathed only once, and in the manner practised by Messrs. Allen and Pepys, any slight variety in the proportions of the gases composing the small quantity of air which may be retained in the chest, can very little affect the composition of the much greater bulk which has been exhaled. The analysis of this expired air may therefore be regarded as affording a very satisfactory illustration of the changes which air in general undergoes, in its passage through the lungs during natural respiration. Accordingly Messrs. Allen and Pepys have demonstrated, by experiments

which seem to be unexceptionable, that, by its transmission through the lungs in ordinary breathing, the air loses about 8 per cent. of oxygen, and acquires an *exactly equal* bulk of carbonic acid, while its nitrogen remains unaltered. They conclude, that 39,534 cubic inches of carbonic acid are emitted daily from the lungs of a full grown person. But we perfectly agree with Mr. Ellis in his objections to this calculation, and are inclined to estimate the average quantity at about 92,160 cubic inches.

Not being acquainted with any attempt, since the imperfect trial made by Mr. Abernethy, to ascertain the composition of the fluid which is brought off by the expired air in the state of vapour, we lately subjected a small quantity of this fluid to accurate analysis. For this purpose, we made a full grown person, in perfect health, expire through a thin glass tube, about three feet in length and a quarter of an inch in diameter, kept at a low temperature, by the evaporation from a slip of muslin moistened in spirits of wine, which was wrapped round it. In four hours, an ounce measure of a perfectly transparent, colourless, and insipid fluid, of the consistence of water, was collected in drops from the extremity of the tube. This fluid did not produce the least alteration on the colours of litmus or turmeric paper. It suffered no change on the addition of corrosive muriate of mercury, tannin, or nitrate of silver. And when a small glass, containing half an ounce of it, was connected, by filaments of moistened cotton, with other two glasses containing each about two drachms of pure water, and these were then attached to the opposite extremities of a galvanic battery, consisting of 24 four-inch double plates of copper and zinc, charged with diluted muriatic acid; at the end of four hours, we could not detect the slightest indication of the presence of albumen in the negative, or any saline substance in the positive glass. Hence we have been led to conclude, that the fluid dissolved in the exhaled air is pure water.

All those animals which suckle their young, constituting the class Mammalia,—for example, the ape, the horse, the dog, the mouse, the seal, and the whale; Reptiles, such as the turtle, the lizard, the frog, and the snake,—and the whole class of Birds,—are provided with organs resembling the lungs of

man, into which they are constantly, during life, receiving fresh air. Analogy alone, therefore, would lead us to suppose, that these animals produce similar changes on it by their respiration. But this inference is in a manner confirmed, by the appeal which Mr. Ellis has made to the experiments of various physiologists on rabbits, guinea-pigs, rats, mice, sparrows, vipers, tortoises and lizards; and by some very neat experiments of his own on toads and frogs. In all these it appeared, that the nitrogen of the air respired suffered no change, but that a quantity of oxygen was removed,—and a volume, nearly or exactly equal, of carbonic acid substituted in its place.

The opinion which seems to have prevailed almost universally of late years, is, that, during respiration, a portion of the oxygen or nitrogen of the atmosphere, or a quantity of the compound atmospheric air itself, actually passes out of the lungs into the blood vessels of these organs, and is combined with or absorbed by the blood; and respiration has been familiarly spoken of as a process analogous, if not absolutely identical, with that of combustion. This combination being assumed as a fact, a variety of other phenomena, more or less at variance with actual experience, have been supposed to succeed or accompany it. According to one hypothesis, the carbonic acid exhaled *might* have existed ready formed in the blood of the pulmonary arteries; and the blood might have a stronger attraction for oxygen gas than for carbonic acid, and, combining consequently with the oxygen of the air, might part with the carbonic acid, which would as easily pass *from* the vessels into the cells, as the oxygen from the cells *into* the vessels. Another doctrine supposed, that a portion of oxygen being attracted by the blood in the lungs, was combined, during the circulation of that fluid through the other parts of the body, with a portion of carbon, so as to form an oxide of carbon; which, on being brought back to the pulmonary vessels, was there united with an additional quantity of oxygen, assumed the state of carbonic acid, and was discharged. In like manner, it was conceived by some, that the water emitted in the state of vapour might be formed by the union of a portion of absorbed oxygen with hydrogen existing in the blood, so as to constitute an oxide of hydrogen, which, on passing into the

pulmonary arteries, combined with another portion of oxygen, and was then exhaled. And, finally, with respect to the nitrogen, some were of opinion, that while the blood actually attracted a large volume of this gas out of the cells of the lungs, it combined only with a small portion of it,—the remainder passing back into the cells again; while others thought it more probable, that no more was absorbed by the blood from the cells, than this fluid permanently retained.

This rapid and easy transmission of gases through the sides of the cells, and vessels of the lungs, which is the common foundation of all these theories, Mr. Ellis maintains, is not only totally devoid of proof, but if sound philosophy only allows us to conjecture, respecting phenomena unseen, from what we have experienced of similar events actually perceived, that it is not legitimate to entertain it, even as an hypothesis. Dr. Lower had indeed observed, that when dark-coloured blood was brought into contact with atmospheric air, it assumed a florid colour; and various other physiologists after Priestley, had proved that this, or any other air containing oxygen, so exposed, lost part of its oxygen, and gained carbonic acid. Lower had also demonstrated, by experiments on quadrupeds, that the change of colour from modena to a scarlet red which the blood underwent in the lungs, depended entirely on the presence of fresh air in their cells: And Priestley found, that when a quantity of dark-coloured blood was tied up closely in a moistened bladder, and hung in the air, the whole lower surface of the blood acquired a coating of a florid red colour, as thick as if no bladder had intervened. From all this, it had been inferred, that, during respiration, either some part of the air passed through the sides of the cells and vessels of the lungs into the blood, or that something was given out by the same course, from the blood to the air, so as to alter the colour of the one, and the composition of the other. But, without denying that, in these instances, the change of colour in the blood depended on the presence of the atmospheric air, or of air containing oxygen, Mr. Ellis has shown, by the most satisfactory experiments, that, in the case where the bladder intervened, neither did the air afford any portion of its gases to the blood, nor did the blood communicate any matter to the air. Thus, when he

put a quantity of black blood into a small bladder, and suspended it in a glass jar containing 13.1 cubic inches of atmospheric air inverted over mercury, he found that the blood soon reddened; that, at the end of two days, the whole of the oxygen of the included air had disappeared—*but that an equal quantity of carbonic had been formed.* Hence it is obvious, that as all the oxygen which had disappeared was converted into carbonic acid, none could have penetrated the bladder, or combined with the blood. On the other hand, when Mr. Ellis suspended, in the same manner, bladders filled with water, or bladders empty, but moistened, in jars of atmospheric air, the oxygen was equally found to be converted into carbonic acid. Since, therefore, it thus appears that a moistened bladder is of itself capable of affording carbon to form carbonic acid with the oxygen of the air, there is no reason for supposing, that the carbon is derived from any other source, where the bladder is filled with blood; and the conclusion seems irresistible, that when dark-coloured blood is reddened by the air, through the sides of a moistened bladder, the air yields no oxygen to the blood, nor acquires from it any carbon; but the carbon of the bladder, by its combination with the oxygen of the air, passes into the state of carbonic acid gas. The doctrine, then, of the entrance of gases into the blood from the air cells of the lungs, can no longer be regarded as receiving the best support from Priestley's experiment. But although the result had been otherwise, and the direct passage of something through the bladder had been unequivocally proved, we should still have been disposed to maintain with our author, that it would not necessarily follow, that any similar transmission of air took place through the sides of the cells and vessels of the lungs. On the contrary, we regard it to be a fact, as well established as any in Physiology, that no part of the body, provided with vessels, however delicate it may be, has ever been observed to permit the smallest quantity of any kind of fluid to permeate through it, as long as the circulation continues in that part; though, as soon as death has taken place, transudation goes on in all textures with the utmost facility. We should not therefore, be entitled to infer, merely because a dead bladder may

seem to allow of the transmission of air, that the cells and vessels of the living lungs are equally permeable to that fluid.

Mr. Davy had concluded from experiment, that 71 or 93 cubic inches of nitrous oxide might, in the short period of half a minute, be absorbed by the venous blood, through the moist coats of the pulmonary veins. Our author's observations, alone, would have left very little doubt in our minds, that, in these experiments, though a portion of gas had disappeared from the air-holder, none had passed into the vessels of the lungs. But we have, ourselves, found, by repeated trials with nitrous oxide and atmospheric air, that, when a given quantity of either of these is frequently breathed, the desire, or sympathetic stimulus to inspire, becomes gradually so strong, and the expirations proportionally so short and restrained, that, at last, when the experiment is terminated from fatigue, the lungs may contain, in some instances, even twice as much air as at the commencement. It is obviously from inattention to this circumstance, that Messrs. Allen and Pepys, in their late investigations, have been deceived into the conclusion, that, when atmospheric air is breathed in this laborious way, a portion of oxygen is absorbed;—a conclusion which, had not Mr. Ellis shown it to be matter of hypothesis and not of fact, we do not hesitate to say, would have led us to doubt the accuracy, even of two of the most eminent chemists in the island.

At the present day, we believe, there are not many who suppose, that any part of the air is conveyed into the blood by the channel of the absorbent vessels: Yet Mr. Ellis has thought it necessary to point out how little grounds there are for such an opinion. We are aware, that experiments upon dogs have been referred to in support of it;—in which, air introduced into the cavities of the pleura or peritonæum, has disappeared in a few days. But we should almost have thought a reference of this nature quite unnecessary, when it is so generally known, that, sometimes, in the human body, in consequence of a very trifling laceration of the lungs from a broken rib, such a quantity of air escapes from the chest into the cellular membrane under the skin, as to blow it up over the whole surface, to the depth of nearly a foot; and yet all this air is gradually re-

moved; so that the body, from having the appearance of a huge bladder fully inflated, in a few days recovers its natural form. Still these phenomena are far from demonstrating, that air, in an elastic state, is taken up by the absorbents of the lungs during respiration.

Having thus shown, that the fundamental principle of all the prevalent hypotheses, respecting the manner in which the air is altered by natural breathing, is inaccurate, Mr. Ellis's simple and most satisfactory deduction on this point may be stated in a few words. Air, examined after respiration, is found to differ from the same air before it is breathed, in having lost a portion of oxygen,—gained an equal volume of carbonic acid,—and in being loaded with watery vapour. This additional carbonic acid, then, is either given out directly by the exhalent vessels of the lungs, or it is actually formed within the air cells. Now, it is not directly emitted from the vessels; for in that case it ought to be discovered in the air expired, whatever the composition of the air inspired may have been: But this is not so; for no carbonic acid is exhaled when hydrogen is breathed. It must, therefore, be formed within the cells. If so, the oxygen entering into its composition must be derived from the air inhaled; for it is not generated, unless that air contains oxygen; and the quantity of oxygen which is lost by the inspired air, is exactly equal to that of the carbonic acid emitted. On the other hand, the carbon with which the oxygen combines, must be supplied by the lungs; and Physiology does not permit us to suppose, that this supply is accomplished in any other way, than by an exhalent secretion from the branches of the pulmonary artery, opening on the surface of the air cells. In what state the carbonaceous matter is secreted, whether purely as carbon, or in combination with other substances, is yet uncertain. Here, however, it may be proper to remark, that since we have estimated, that about 92160 cubic inches of carbonic acid are formed, by the direct combination of its constituent principles, within the air cells of the human lungs, in the course of 24 hours, it follows, that as much latent heat is daily set free, within these organs, as would melt 201.03 lib. troy of ice. Lastly, with respect to the water which is found dissolved in the expired air, we may observe,

that we cannot regard it as formed by the union of the oxygen inhaled, with hydrogen present in the air cells; for all the oxygen which disappears is employed in forming the carbonic acid. In consistency with physiological principles, therefore, we must suppose, that it is poured out on the surface of the cells, either in the state of pure water, or holding other substances in solution, by an exhalent secretion from the vessels of the lungs.

We cannot leave the consideration of the changes produced on the air by animals provided with lungs, without adverting to another very singular alteration, which Mr. Ellis has, with great ingenuity, suggested that it may undergo, from its introduction into these organs. Messrs. Allen and Pepys had found, that when they respired pure oxygen, a quantity of nitrogen considerably greater than what could reasonably have been supposed to have existed in the lungs before the experiment, was mingled with the expired air, and that an equal bulk of oxygen gas had disappeared. In like manner, when a guinea-pig was made to breath pure oxygen, or a mixture of this gas and hydrogen, the expired air contained a volume of nitrogen much more than equal to the cubic contents of the animal's body, and had lost a proportional bulk of oxygen or hydrogen. It was observed, too, that the emission of nitrogen was always greatest in the first expiration; and that its quantity progressively diminished, until, towards the close of the experiment, it was reduced almost to nothing. Far from regarding these phenomena, with Messrs. Allen and Pepys, as proving an evolution of nitrogen from the blood, and a corresponding absorption of oxygen or hydrogen, Mr. Ellis infers, with more accuracy, that the nitrogen must have been derived from the residual air in the lungs, and that it has been displaced from the cells by the mere mechanical substitution of the other gases. But if this inference be just, since a much greater volume of nitrogen was emitted, than the lungs could have contained of that gas in an elastic state, we cannot but suppose, as has been argued by our author at great length, that these organs exert, upon inspired air, a property similar to that which chemists have proved pieces of porous charcoal to

possess, namely, a power of attracting and *condensing* several times their volume of atmospheric air, oxygen, hydrogen, nitrogen, and various other gases. Hence, though the lungs do not contain a greater *bulk* of air than has commonly been supposed, yet they may, in fact, contain a greater *weight* of that elastic fluid. Mr. Ellis will not be displeased to learn, that this analogy had occurred, many years ago, to one of the most judicious of the French physiologists, M. Hallé. Among a list of questions connected with respiration, which he proposes for resolution, we find the following:

'Dans les altérations qu'éprouve l'air dans la respiration, 'en est-il qu'on doive attribuer plutôt au poumon qu'au sang? 'et indépendamment de l'humidité pulmonaire, la propriete 'singuliére qu'ont la plupart des corps spongieux d'absorber 'les gaz et de leur faire perdre l'état élastique, ne peut-elle pas 'entrer pour quelque chose, dans les fonctions que le poumon 'remplit dans la respiration?' *Encyclop. Meth. Medecine*, I. 506.

Land animals of the classes of Insects, Mollusca and Vermes, and Terrestrial Ova, Larvæ and Chrysalids of insects, operate upon the surrounding air, either by receiving it into cavities, which they can enlarge or diminish at will like lungs; or into tubes, called tracheæ, opening externally by orifices or stigmata; or the power of acting upon it seems possessed by the whole surface of the body.* There can be little doubt, from the numerous experiments which our author has detailed on bees, flies, grasshoppers, slugs, snails, earth-worms, and various larvæ and chrysalids, that all these, like man, remove, by their respiration, a certain quantity of the oxygen of the air, and substitute a corresponding bulk of carbonic acid, leaving the nitrogen unaltered. But it is certain that they produce no carbonic acid, unless when in contact with air containing oxygen. It is most consistent with analogy, therefore, and it is in

* We have adopted the classification of animals, which will be found proposed under that article in Dr. Rees's Cyclopædia, composed, we presume, by Mr. Macartney. It seems to us superior to any that has yet been offered to the public. In applying the terms *Land* or *Terrestrial* to animals, we wish them to be understood as designating those which are killed by immersion in water, in opposition to the *Aquatic* class, or such as die merely from being removed out of that fluid.

no respect incompatible with the anatomy or physiology of these animals, to suppose, that, in changing the surrounding air, they merely afford to it, by a process like secretion, a certain quantity of carbonaceous matter, which, uniting with its oxygen, constitutes an equal volume of carbonic acid.

The water of springs, rivers, and of the sea, always contains from $\frac{1}{28}$ to $\frac{1}{36}$ part of its bulk of an air, composed of from $\frac{34}{100}$ to $\frac{36}{100}$ of oxygen, from $\frac{56}{100}$ to $\frac{59}{100}$ of nitrogen, and from $\frac{5}{100}$ to $\frac{10}{100}$ of carbonic acid. Now, all aquatic animals, such, for example, as the whole class of fishes, many insects, mollusca, vermes, and zoophytes, and several aquatic ova of land animals, are constantly producing changes on this air contained in their natural element. Fish act upon it through the medium of organs familiar to every one, called gills; and the animals of the other classes, either by means of organs like the gills of fish, or of tubes like the tracheæ of many terrestrial insects; or by a structure, too minute to be seen, existing on all parts of their surface. With respect to the alteration which they effect, Mr. Ellis has quoted a variety of experiments on different kinds of fish, muscles, marine testacea, snails, leeches, zoophytes and tadpoles, in which it was found, that the water in which these animals were placed, lost a part of its oxygen, and received an addition of carbonic acid, while its nitrogen remained unaffected. It was not actually demonstrated, in these instances, that the quantity of carbonic acid produced, exactly equalled the oxygen which had disappeared; but we confidently infer, with our author, that this was the extent of the change. Nor have we less hesitation in concluding, that the carbonic acid was formed, by the combination of carbon separated from the animal by the vital process of exhalation, with the oxygen of the air contained in the water. And here we cannot refrain from quoting the beautiful provision of nature, which Mr. Ellis has developed. The experiments of Scheele and others had shown, that water possesses a superior attractive power for oxygen; and that, as it attracts this gas, it parts with its carbonic acid: so that the latter never exceeds a certain quantity, in the water either of springs or of rivers. And hence, says Mr. Ellis, 'the noxious gases, formed in 'water by the exercise of the animal functions, and by the de-

'composition of organic bodies, are regularly expelled; and 'thus the air, destined to support the living functions of aqua- 'tic animals, like that of the atmosphere which we breathe, is 'maintained nearly in a uniform state of composition and 'purity.' § 558.

The experiments of Hooke and Spallanzani, referred to by our author, prove, that the order of zoophytes called Infusoria, such as the animalcules of vegetable infusions, of vinegar, and of stagnant waters, are killed by placing these fluids in a vacuum, or stopping them up closely in a phial. And, in the absence of any direct proof, we may presume, that, like other animals, they exhale carbon, which combines with oxygen existing in the medium in which they live, and forms carbonic acid.

Lastly, we think it extremely probable, that those detached and apparently irritable substances, called Hydatids, so frequently discovered in diseased parts of other animals, and which might with propriety be constituted into an order of zoophytes under the name of Parasitica, act in a similar manner upon oxygen contained in the fluids which surround them.

Thus Mr. Ellis has conducted us, by satisfactory experiments, and the most reasonable analogies, to this great inference, that every individual in the animal kingdom is continually exhaling carbon, to form carbonic acid with the oxygen of the atmosphere, or of the air existing in the fluids in which it lives.

We should now willingly have followed our author through the various stages of his interesting inquiries into the Respiration of Vegetables. But as we have already almost transgressed our limits, we shall content ourselves with a few such remarks on his researches in this department, as we hope will induce our readers to consult the work for themselves.

In the first place, then, Mr. Ellis seems to have abundantly established, both by numerous experiments of his own, and an appeal to those of preceding writers, that all terrestrial plants, whether growing in absolute darkness, in the shade, or exposed to the direct rays of the sun, are constantly removing a quantity of oxygen from the atmosphere, and substituting an exactly equal volume of carbonic acid:—that they produce this

change, by emitting from their leaves, flowers, fruits, stems and roots, by a process like animal exhalation, carbonaceous matter, which combines with the oxygen of the surrounding air; and that this function is essentially necessary to their vital existence.

But it is also shown, that the green parts, and the green parts alone, of these plants, when placed in the light, and particularly in the direct rays of the sun, while they are exhaling carbon to form carbonic acid with the surrounding oxygen, are also giving out a portion of pure oxygen;—that this oxygen seems to be derived from the decomposition of carbonic acid existing in the cellular texture of their green parts;—that this acid appears to be decomposed by the chemical agency of the solar light, which, penetrating into the cells containing it, resolves it into carbon and oxygen, whereof the former is retained, while the latter escapes through the external pores;—and, finally, that this process is not a constant and invariable function necessary to life, but an effect, in a manner additional, or subordinate; for a plant does not die when this formation of oxygen has ceased; and it may be found to occur in a dead plant as well as in one that is alive.

It was this production of oxygen by the green parts of plants exposed to light, or apparently depending on the decomposition of carbonic acid, which gave rise to the opinion, almost universally maintained since the time of Priestley, that by an admirable provision of nature, vegetables, in all circumstances, were continually employed in purifying the air, which had been deteriorated by the respiration of animals. But it is indeed scarcely possible, as our author has observed, that this opinion could have obtained such general regard, had not physiologists and chemists obviously satisfied themselves with contemplating, at a distance, the beauty of the Final Cause whose existence is implied, instead of carefully examining the facts by which it had been suggested. Mr. Ellis seems to have been the first to question their accuracy; and to show, that they were not only, even according to Priestley's own representation, imperfect and contradictory in themselves, but also in direct opposition to the experience of Priestley's cotemporary, the celebrated Scheele. We have pleasure in quoting the senti-

ments with which our author has closed his exposition of this very popular, and perhaps not unnatural error. They are written with that modesty and candour, which we wish to consider as virtues inseparable from minds truly intelligent; and we value them the more, that, in physiological discussions, they are comparatively rare in their occurrence.

'We have been drawn into these detailed remarks, not from any desire to depreciate Dr. Priestley's labours, but from the circumstance of their having first given origin to the opinion, that plants, by their vegetation, at all times purify the air; and from a consideration of the importance which has ever since been attached to them. In the experimental sciences, it is chiefly by the successive detection of each other's errors, that we gradually advance to truth; for rarely, indeed, does it happen, that human sagacity can at once foresee and appreciate all the possible circumstances in an experiment, which may influence and control its result. There is, therefore, no cause to wonder, that this illustrious philosopher did not discover those sources of fallacy, which the more advanced state of science has alone enabled his successors to point out. And the reflection, that our apparently more correct views may, at no distant day, undergo a similar revision, ought not only to teach us becoming diffidence in our own opinions, but may serve to check that rising triumph which little minds are sometimes apt to feel, when they see thus exposed the mistakes of superior men.'—§ 254.

Were the excellent remarks also contained in the following extract, limited in their reference merely to the subject under discussion, we should not probably have detained our readers by inserting them; but they are of much more extensive application. There is a class of scientific inquirers, of late years rather increasing in number, who seem disposed to measure the power of man by the extent of their own individual exertions; who would damp the noble ardour of philosophical pursuit, and check the progress of discovery, by throwing in our path every obstacle which their ingenuity can construct out of the crude and feeble materials of vital principles, and final causes, and ultimate facts; and who scarcely scruple to affirm, with a confidence which we are convinced their more enlarged expe-

rience will induce them to regard as unreasonable, that they have already attained the utmost boundary to which the human faculties can reach. Against such narrow views, our author's observations contain a just and eloquent appeal.

'But there have been writers,' says he, 'who rested their views of the purification of the atmosphere by vegetation, not so much on observation and experiment, as on what they conceived to be its necessity in the general economy of Nature; and, with more, perhaps, of piety than of prudence, and certainly with a "zeal not according to knowledge," have represented the contrary doctrine as derogatory to the wisdom of Providence, and a calumny against Nature herself. It is indeed true, and it is among the most gratifying truths in the pursuit of science, that every real step which we make in the knowledge of nature, serves to illustrate the skill and wisdom with which all its parts are contrived to advance the general purposes of the whole; but of this whole it should also be recollected, that we, "as yet, see but in part "and as through a glass, darkly." Hence imperfect and erroneous views of the order of nature may be often taken, and false conclusions may be grounded on them; and if these conclusions be afterwards announced as examples of divine wisdom, and be allowed to borrow the authority of final causes for their support, the history of science abundantly testifies that the vainest conceits of fallible man may, in time, come to be worshipped as the wisest institutions of unerring nature. It behoves us, therefore, to employ no ordinary portion of delicacy and caution in pronouncing on the general plans and purposes of Providence, from the little and partial views of nature, which, at present, we are permitted to take; lest, in the effervescence of our zeal, we degrade the wisdom we pretend to exalt, and prevent the designs of the goodness we profess to revere. With respect also to the charge of calumniating nature, he surely who, by assiduous observation of the facts which she offers to his contemplation, seeks to discover the laws of their connexion, and proposes his opinion of those laws as the simple result of his inquires, may be regarded less as a calumniator, than he, who supplies the imperfection and deficiency in his facts, by the suggestions of imagination; and confidently

imposes upon Nature, laws and conditions, which she utterly disowns and disdains.' §§ 531, 532.

Since, then, it appears, that plants, as well as animals, are incessantly converting the pure part of the air into carbonic acid, and since it is also very generally known, that notwithstanding the vast extent of this deteriorating process, the atmosphere still maintains its uniformity of composition, at all times, and in all places; it is natural to ask, where are we to look for the means of its purification? To this most interesting and difficult question, our author thinks that, in the present state of our chemical knowledge, no satisfactory answer can be returned.

Lastly, Mr. Ellis, investigating the source of the oxygen emitted by the green parts of plants when exposed to light, has been led to one of the most beautiful theories, that have been suggested in modern physiology; That the various colours which adorn the vegetable kingdom, depend on the varied proportions of alkaline and acid matter mixed with the juices of the coloured parts of plants: That green and yellow, for example, are always produced by an excess of alkali, in the colorable juices of the leaf or flower—and all the shades of red by a predominance of acid; and that, in parts where neither acid nor alkali predominate, the colour is white: Just as, in an experiment familiar to every one, we convert an infusion of green leaves into red, by pouring into it a little vinegar—or an infusion of red flowers into green, by a few drops of potass or ammonia—or destroy the colours of both infusions entirely, by adding the alkali and acid in such proportions, as that they shall exactly neutralize each other. But it is well known, that the presence of light is essentially necessary to the production of colours, in various plants. Thus, if a plant, which is naturally of a green colour, be made to grow in total darkness, the leaves and other parts, as they unfold themselves, will appear perfectly white, and remain so. But if we now bring this *etiolated* plant, as it is called, into the light, the blanched foliage, and the young leaves, as they expand from the buds, will soon acquire a yellowish tint, which will gradually deepen into a green; and this colour, after being completely formed, may again be made to disappear by returning the plant into a dark place.

The etiolation, or blanching of the roots of celery, and of the inner parts of cabbages and lettuces, are familiar examples of the same kind. In like manner, if red rose trees are carefully secluded from the light, they will produce flowers almost white; or if a portion of a ripening peach or cherry be covered with a peace of tinfoil, the uncovered parts of the surface will become perfectly red, while the covered portion will exhibit only a pale, or straw-colour.

Now, in all these instances, our author has suggested, that the light contributes to the development of the colour, merely by modifying the portions of alkali or acid matter in the fluids of the part. For it is found, that the blanched leaves of an etiolated plant abound in carbonic acid, and that they not only contain less alkali than green leaves, but that this alkali exists in a more neutralized state: and hence, according to Mr. Ellis, their white colour. But as soon as the plant is brought into the sun, the chemical action of the solar beam begins, as it would seem, to decompose the carbonic acid existing in the white parts; the alkali by degrees comes to predominate; and the colour of the leaves is observed to pass gradually into a full green. Thus, too, a reason may be assigned, why the green parts alone of plants placed in the light have been said to afford oxygen: for, in fact, the emission of oxygen, and the production of the green colour, appear both to depend on the same cause—the decomposition of carbonic acid; so that we cannot so properly affirm that the green parts afford oxygen, as that they become green when that gas is expelled. Again, when, in the fall of the year, vegetation begins to decline, alkaline matter seems less abundantly supplied; while spontaneous decomposition appears actually to increase the quantity of acid in the leaves: and, according to the various proportions of acid which are developed in the leaves of different plants, the foliage exhibits those various shades of brown, or those bright tints of yellow and red, which so beautifully diversify an autumnal scene. On the other hand, it would seem, that, when the sunbeams either entirely produce, or only heighten the red colours of flowers or fruits, they produce these effects by some chemical action, which favours the formation of acid in the juices of the coloured part.

These very novel and ingenious views, so consonant with the usual simplicity of Nature's operations, are unfolded at great length by our author, in two sections, which will probably appear the most generally interesting in his Inquiry. They are accompanied, also, with an able disquisition on the causes of colour in bodies in general; and on the analogy, in chemical operations, between the two kinds of electricity and the two species of invisible rays in the solar beam—the chemical and calorific. Of the former, we have only to remark, that Mr. Ellis has both appreciated with judgment, and contributed to confirm, the valuable though much neglected views of Delaval and Bancroft. With respect to the latter, we can scarcely venture to grant to our author, that the analogy in question exists to the extent to which he has endeavoured to trace it. We do not, however, withhold our assent, from conceiving that there is any defect in the reasoning which Mr. Ellis has employed —for, indeed, if the *data* he has assumed be granted, we believe the conclusions he has deduced from them are altogether unobjectionable—but because we strongly suspect that most of the observations on the operation of galvanism in chemical decompositions, which have lately been offered to the public under the specious names of 'general laws,' and 'statements of fact,' are blended with hypothesis to no inconsiderable extent.

Our author does not seem to have made any observations on the respiration of aquatic plants: but we may presume that, like aquatic animals, they possess the power of producing changes on the air combined with the water in which they grow, similar to those which terrestrial vegetables effect on the air of the atmosphere.

From all these views, therefore, we are fully disposed to conclude, that the author of the volumes before us has satisfactorily established this important general truth in philosophy,—That the change which all animals and vegetables are continually producing on the atmosphere, or on the air of the fluids in which they live, consits simply in the conversion of a portion of oxygen into an equal bulk of carbonic acid, by the addition of carbon exhaled from the living organized body.

And now the question will naturally again suggest itself, why is this exhalation of carbon, and conversion of oxygen

into carbonic aid, essentially necessary to the occurrence of that assemblage of phenomena which we express by the term Life?

It is pretty bold, we think, in any physiologist to undertake to answer such a question as this; and indeed it is plain enough, that any answer which human genius can give to it, can only remove our insurmountable ignorance one degree further back, and merely reduce, under a more comprehensive denomination, all the miscellaneous phenomena which indicate the inexplicable combination of organized matter with sensation and perception. This, indeed, is all that Mr. Ellis probably proposes to attempt in the succeeding part of his publication, as we observe that he only announces his expectation of being able to trace all the effects which are observed to depend on respiration in animals and plants, to the agency of that subtile or calorific matter which is universally liberated on the conversion of oxygen into carbonic acid, and which enters into the animal and vegetable systems. It is impossible not to anticipate the explanation which such a view will at once afford of many puzzling and obscure phenomena: we need only allude to two, the change of colour, from modena to scarlet, which the blood undergoes in the lungs of a full grown person; and the corresponding change which the blood of the child suffers, in the placenta, within the mother's womb. In both instances, Mr. Ellis, we presume, will say, *caloric*, and not the absorption of any *gas*, is the agent which operates the change.

Of Mr. Ellis's style, we have nothing to observe but in commendation. It is pure and perspicuous throughout. We think, however, that the arrangement of his work is susceptible of improvement. The order which we have followed, in exhibiting a general view of the subjects it embraces, is nearly the reverse of that in which they are treated in the Inquiry itself. The author seems to have adopted, as the foundation of his arrangement, a principle almost generally admitted, it is true, in physiological writings, but admitted, we apprehend, on very insufficient proof; namely, that zoophytes and vegetables, or the lower classes, as they are called, of organized bodies, are the most *simple* in their structure; and, therefore, that in the investigation of any general function in the economy of living

beings, we ought to rise gradually, from the contemplation of the more simple properties which, it is presumed, bodies simple in their structure possess, to the study of the complicated phenomena, accompanying a more complex organization. To this, however, we would reply, that in man the phenomena of life are exhibited on the grandest scale, and in circumstances the most favourable to accurate observation, and that with the human body, therefore, the properties of every other form of organized existence ought to be compared; that if the structure of the lowest classes appears more simple, it is only because it is more minute; and that, in truth, none of them are totally devoid of any of those properties which seem essential to life in the higher classes—although our senses, even when aided by the most powerful instruments, have not yet been able to perceive the individual parts by which these properties are exercised. M. Trembley has described, in one of the most interesting and best written memoirs in natural history, three kinds of fresh water polypes, which consist merely of a cylindrical tube or pouch, open at both ends, formed of an extremely thin, transparent skin, in which not the slightest appearance of nerves, or muscular fibres, or vessels, can be seen; animals which can be cut into slices almost in every direction, and each slice becomes a perfect polype; nay, what is even more extraordinary, which may be turned outside in, and still continue to live as well as before. Yet these singular beings exhibit the most unequivocal indications of volition in their various motions from place to place, either to expose themselves to the pleasing influence of light, or in search of insects often larger than themselves, which they dexterously entangle in their arms, convey to their mouth, and devour with the utmost voracity. Voluntary motions, like these, we conceive dependent only on the previous consciousness of sensations and ideas. The apparently insignificant creatures which exhibit them have obviously the same motives to action as ourselves—the love of pleasure, and the fear of pain. But sensation, ideas, and volition, are phenomena which uniform experience has taught us, are inseparable from a nervous system; the conclusion, therefore, with respect to the polype, cannot but be obvious. In man, these phenomena are exhibited by parts so large, as to be observed and distinguished with ac-

curacy, both in form and composition; in the poylpe, the corresponding organs are so minute, that they are wholly imperceptible to the quickest eye. And if this inference be just, can it reasonably be maintained, that *simplicity* of structure is the most distinguishing character of these lower animals? For our own parts, so strongly are we impressed with an opposite opinion, that when we compare these two extremes of organization, and reflect on the much greater difficulty which attends the construction of every thing that is minute in the works of art, we hesitate which to regard as the more wonderful production of Incomprehensible Power—the obscure and diminutive Polype —or Man, the lord of the creation.

Einleitung in die Augenheilkunde, von Dr. Karl Himly, *ordentlichem öffentlichen Lehrer der Medizin zu Göttingen, &c.* 8vo. S. 104. Jena. *Imported by* Boosey, London.

[From the London Medical Review, for October 1811.]

This small volume contains the substance of three tracts on diseases of the eye, first published in the *Ophthalmologische Bibliothek*, a work conducted by Himly and Schmidt of Vienna; both well known in Germany, as lecturers on medicine, and as the authors of several ingenious papers on the physiology and diseases of the eye. With the latter subject Himly appears to be well acquainted. He has seen and practised much, and writes with the ease and confidence of a person who has been often an eye-witness of what he describes. His practical remarks however, are occasionally interrupted by a little physiology, not of the most intelligible kind, especially to those who are unaccustomed to the phraseology of the German schools. The first paper contains a short review of the present state of medical science on the continent, as far as relates to the treatment of the disorders of the eye. Himly sets out with deploring the evils which have arisen from the trifling attention paid to the subject by the generality of medical men. The consequences have been, that but few possess accurate and well grounded knowledge of the subject; and that from the neglect

of the many, occasion has been given to ignorant pretenders of taking this branch of medicine to themselves. Their endeavours have afterwards been directed to secure it; and from an acquired dexterity in performing some few operations, they now lay claim to the exclusive care of every disorder of the eye.

The time has been when these observations might have been applied to the state of the medical profession of this country; but the case is now different, and the subject appears at present to command unusual attention. We have been already presented with some valuable publications; we are led to expect more; and we have seen established within a very few years, infirmaries designed exclusively for the care of diseases of the eye. In the hands of liberal and able men such institutions must have the best possible effect. They will provide the surest means of obtaining a more accurate knowledge of the diseases of this delicate organ, by affording an extent of observation which no sphere of general practice could possibly accumulate. We are sorry however, to observe, that of the two establishments in this metropolis, one only fulfils this great object of its existence, by exposing its fields of observation to the profession in general. The practice of the other is carefully confined to the operator and his single assistant. By some fortuitous circumstance, or through very particular interest, a student may perhaps obtain the useless favour of witnessing a solitary operation; but the infinitely more important part, the medical and surgical treatment of the varieties of disease which must daily occur at this public charity, is kept wholly to themselves.

Much advantage has certainly arisen to medicine from the attention of an individual being directed to some particular object of the art, to some natural class of diseases, or to the diseases of some one organ. But if the result of the knowledge thus obtained is to be possessed only by the individual, or by a chosen few, it will be allowed that the knowledge has been gained for little useful purpose. It is reasonable to expect great advantages from institutions like those above referred to, where the diseases of a particular organ are seen on the broadest possible scale, and where every facility is

afforded of bringing the varieties of operations, and the actions of different remedies to the test of comparative experience. But how can we expect these advantages where a public institution is made an object of private interest, and the world is deprived of those benefits which would result from more diffused experience and observation. While on this subject we may be allowed to add, that we cannot see in what way the public is benefited by confiding the treatment of diseases of the eye to the exclusive care of a few individuals. Granting that a dexterity in operating upon this delicate organ is to be acquired by an observance of minutiæ which extensive practice alone can bestow, we would remark that the diseases of the eye which require operations are comparatively few; and we think we have more than once observed, that this acquired dexterity was by no means adequately supported by an accurate and extensive knowledge of disease; but where, on the contrary, it appeared to be always uppermost in the mind of its possessor, whom it diverted from proper attention to more humble, but equally useful objects.

Besides if a dexterity sufficient to secure the object of the operation is only to be acquired by a few and by repeated practice, it will be at once evident that of necessity the majority will be excluded from reaping any benefit from it. The fact is, that an accurate acquaintance with the anatomy of the parts, and a thorough knowledge of the principles on which the different operations are performed will secure to their possessor the same success as they always do in performing operations on other parts of the body. The difference is not so essential, or the difficulties so great, as to prevent any intelligent and well educated surgeon from practising this as successfully as any other part of his profession; and experience has fully proved that the advancement of this department of surgery has been owing, not to the genius of the few who have exclusively devoted themselves to the subject, but to those who have combined a more extensive insight into the powers of the system in general, and whose comparative knowledge of disease has deduced the most effectual means of relief. We might illustrate this from the labours of Pott, of Richter, of Scarpa and of Hey, whose improvements in the operative

treatment of diseases of the eye are not more conspicuous than in various other branches of the profession. In truth it is probable that the distinction will at no distant period be done away, and the treatment of disorders of the eyes be confided to the same men to whom we trust the care of other important organs. The only plea for separating them is founded on the nicety and skill requisite to perform operations, and in the present advanced state of anatomical knowledge and surgical skill, we think the necessity will not be found to exist.

In the second part we find a very full detail of the plan to be followed in examining a disordered eye. It contains some useful observations; nor will his directions appear unnecessarily minute, to any one acquainted by practice with the difficulties which often occur in gaining a sufficient insight into the nature and condition of the disease. It is not every complaint of the eye which requires so full an examination as is here recommended; but we should recollect, that a careless or incomplete examination is, in many cases, full of evil consequences. And where there exists no marked organic mischief, we gain no little knowledge when we ascertain the general condition and constitution of the eye, which is more particularly open to any one species of disordered function.

Our attention is first directed to the position of the patient and the light. It will be sufficient to remember that the best light only dazzles when reflected unfavourably, and that the examiner often causes this faulty reflection by the unfavourable position in which he places his patient, or by teasing the eye till it is full of tears. "The best way is to hold a moveable object before the patient's eye, which is to be fixed on it; the object is then to be moved in every direction until the examiner sees clearly into the eye, and there to be kept until he is satisfied." "It is often useful to throw a stronger light on the eye by a concave speculum, or to examine it through a convex lens."

In cases of acute disease when the eye is irritable, and the orbicularis acts strongly on the admission of light, the eye is to be shaded, and the patient invited to open the lids, as every attempt to force them asunder only increases the action of the muscle, and causes its eversion. In such cases the simplest

mode, and one which insures a complete view of the eye without any injury, is to elevate the upper lid by passing a thin Pellier's speculum underneath it. It appears certainly at first more alarming than opening the lids by the fingers, but in fact it causes less pain and infinitely less disturbance.

Another obstacle to the complete examination of an eye is the iris, the pupil closing in proportion as we admit light; and as the iris is in front of many important parts, it often impedes an accurate knowledge of their condition. To obviate this, Himly employs a solution of the extract of hyoscyamus in water, which he drops into the eye; or he applies a plaster of hyoscyamus near the eye, which causes a complete dilatation of the pupil; the effect continues five or six hours. We have generally seen the extract of belladonna employed for this purpose; a small portion being placed either between the eyelids, or a larger quantity rubbed upon the eye-brows and temples. Being a foreign substance on the conjunctiva it causes some redness and watering, and does not appear to be more efficacious than when applied upon the eye-brows. The pupil is sometimes thrown so widely open as to afford a view of the anterior edge of the ciliary processes in front of the edge of an opake lens. The motion of the iris is never eventually injured by this application even when used for a considerable time, and it affords the only effectual mode of examining those early changes of the retina which attend the formation of that disease which has been termed fungus hæmatodes in the eye. In these cases the pupil is at first so much contracted, that a very small portion of the retina can be perceived, but by the application of the belladonna, the whole extent and the appearances of the disease may be ascertained. The power of this application on the iris does not appear to be at all influenced by the state of the retina, since it produces exactly the same effect in the most obstinate cases of gutta serena. Its effects upon the retina are the same as those of narcotics in general, namely, dulness of sight, strabismus, &c. and its action on the iris is equally certain when taken into the stomach as when applied locally. From this property of exciting contraction in the iris it is an agent of great surgical importance, in preventing adhesions which so frequently succeed inflammation between the

iris and inner surface of the cornea, in obviating that slow inflammation of the iris which causes obliteration of the pupil after the extraction of the cataract, and also in preventing those adhesions and contractions which have frustrated the success of most operations for artificial pupil.

We are next directed to observe the general situation of the eye in the orbit, and the appearances of the lids. The diseases of the latter and the points to which our attention should be directed in examining them are briefly touched on, but in a manner which at once bespeaks a perfect familiarity in the author with all the various forms in which they appear.

As a favourable and at the same time useful specimen of the manner in which the subject is treated we have taken the remarks of our author on ascertaining diseased appearances in the eye:—

"18. Observe the size of the eye-ball, its motion, and the direction of one as compared with that of the other; also its softness, or tension.

"19. Conjunctiva. Observe its connexion with the parts below, if tight, or loose. The number of red vessels in it, and the colour of the blood they carry, bearing in mind that often the eye becomes bloodshot while you are inspecting it, when it was nearly bloodless when you began. Mark if these vessels are in the conjunctiva or sclerotica; if running in straight lines with numerous intersections, or in convoluted or tortuous courses. If any pustules, ulcers, &c.

"20. Cornea. Examine it in front and sideways; its convexity, clearness, and polish: if any zone of vessels round its connexion with the sclerotica: if any red vessels crossing it; if running into its substance, or over its surface.

"21. Sclerotica. If any unequal surface, any bulging, or pits: any spots of a dark blue appearance, and semitransparent: any ulcer, or fungus, &c. any deposit between it and the conjunctiva. The vessels of the sclerotica may be distinguished from those of the conjunctiva by their straighter course, and their more fixed situation.

"22. Iris. Its colour; if any distinct red vessels, or any redness, the consequence of acute or chronic inflammation; particularly at its innermost circle, which is more frequently made

unnaturally vascular and reddened by such causes. This redness is often discoverable by a large reflected red tinge on the cornea when viewed sideways, which tinge disappears if the iris is made to form only a narrow ring by the action of the hyoscyamus. If its colour is dull: the pale gray appearance is often observable after acute inflammation of the iris. The colour of the iris is often changed by the faulty colour of the aqueous humour; for instance, after extravasations of blood, or pus into the anterior chamber. The colour of the iris differs sometimes in the two eyes: in other instances it is particoloured. Observe also the colour of the iris as connected with any particular class of diseases.

"23. Pupil. Its size, shape, regularity of margin; if it lies even, bulges, or is drawn back, or to either side.

"24. The texture of the iris. If thin, or thicker than natural; if uniform in structure, or showing a kind of net-work, made by projections and surrounding spots.

"25. Further observe the general position of the iris: if flat, concave, or convex. The latter betokens generally some disease of parts behind: its concavity often follows the absorption, or dislocation of the lens. Its natural situation, however, varies considerably in different individuals. It is always more convex in young children. Observe also if it swings backwards and forwards on moving the head or eye.

"26. The motion of the iris. If the contraction and dilatation of the pupil be in proportion to the admission and exclusion of light. If it moves quickly or sluggishly. If it fixes steadily and at once, or oscillates after having been put in motion. If more movable in one eye than in the other. In some cases the natural motion of the pupil is reversed, dilating in proportion as the light is admitted. This fact (for I have witnessed it in a case where the patient was almost blind) arises, I think, from too great a sensibility of the retina, which becomes paralized on the admission of light, the pupil being contracted to the utmost when the eye is shut, or the place made nearly dark. Observe also if the pupil dilates equally, or if any part hitches. Even where the pupil remains unaltered in all changes of light, we are not hastily to conclude that no action takes place in the iris. The pupillar edge may be adhe-

rent to the capsule of the lens, and by close inspection we may still discover some motion in its fibres, or some change in its position.

"28. The anterior chamber. Be careful not to mistake a cloudiness and thickening of the cornea for a turbidness of the aqueous humour. Collections of puriform fluid in the anterior chamber are not at all uncommon, but must be distinguished from the milky cloudiness of the cornea observable so often in inflammations. Collections of matter are always at the lower part of the chamber, and generally vary their position if the patient lie down on one side. The aqueous humour often appears reddish by reflection from the iris or cornea.

"29. The bottom of the eye. Observe its colour, and the transparency of the parts behind the pupil. The darkness of the pupil often depends on the position of the patient, the degree of light, and the width of the opening. We are sometimes deceived by reflections from opacities at the edge of the cornea, which throw a grayish shade on the opening. The pupil not appearing of a clear black has been set down as the mark of some unsoundness behind, when it only depended on the circumstances attending the examination. Thus the pupil often appears gray and smoky in sound eyes with perfect vision. When the pupil is really cloudy from disease, distinguish if the cause lies in the lens or its capsule, in the vitreous humour, or in the retina. Does the paleness of colour so often seen in amaurosis proceed from an opake retina, or a deficiency of pigmentum?

"34. Vision. Is sight lost or only defective? Do objects appear too large or too small? Are they doubled, or only half seen? Do objects at rest appear in motion? Is there any appearance of the rainbow colours round the object; and if so, is it constant, or only under particular circumstances? Is the object seen plainly at first, and does the sight fail only after continued inspection: or the reverse, does the object become clearer by intently viewing it? Is the duration of perfect vision short? How is the sight at different times of the day? Is it better in a bright or dull light, when the eye or back is opposite to the light? At what distance is vision most distinct? Is the distinct vision of small objects confined to a small space? Are colours

accurately distinguished, or are they mistaken one for another; and if so, are the colours changed to lighter, or darker? In all your inquiries compare the powers of one eye with those of the other."

These are only a small part of Himly's directions: his inquiries are extended much further, and to many other points. Enough however, has been given to show the spirit in which they are written, the end at which he aims. We wish that a recollection of them may be of use to any of our readers, by reminding them of the necessity, which really exists, of minute investigation and attention to every appearance, in the investigation of the diseases of this organ. The eye, of all organs, is not the one to bear without injury the indiscriminate application of active remedies, now so generally employed. The just dread of doing injury has in some instances given rise to a feebleness of practice, which allows the disease to proceed till its advance can no longer be arrested. In the opposite extreme an end is put to the eye and to the disease by the untimely or improper interference of too active means. The evil in both cases arises not so much from ignorance of the different remedies as from the want of knowing the exact nature of the diseased appearances, and the powers and actions of the different structures which are engaged in them.

The third tract contains some remarks on the best means and forms of applying medicines to the eye; and on the remedies best adapted to its diseases. We do not see any thing of importance in it, which we can suppose not to be known to the generality of our readers. Only let it be remembered that whatever remedies are recommended should be carried into effect with as much gentleness as the case will allow. Much harm is often done by coarse remedies, and by rough manipulations in the application of those which are excellent in themselves: so much indeed, as utterly to do away any good which might otherwise be expected. Excepting in cases where the disease is manifest, we should never slur, or give up the examination of a diseased eye from the fear of giving temporary pain. But it is of such very great consequence whether this be done by a clumsy, or by a light and agile hand, that we cannot too strongly inculcate the necessity of acting with delicacy.

This applies still more forcibly to the mode in which we administer our remedies: success depends essentially on the form and manner of their employment.

A Treatise on some Practical Points relating to the Diseases of the Eye, by the late JOHN CUNNINGHAM SAUNDERS, Demonstrator of Anatomy at St. Thomas's Hospital, Founder and Surgeon of the London Infirmary for curing Diseases of the Eye. To which is added, *A short Account of the Author's Life, and his Method of Curing the Congenital Cataract, by his Friend and Colleague*, J. R. FARRE, M. D. The whole illustrated by coloured Engravings. London, 1811, large 8vo. pp. 216.

[From the New Medical and Physical Journal, for April 1812.]

THE name of Saunders must be familiar to most of our readers, for there are few, we presume, who are unacquainted with the Establishment of the Institution in the metropolis for curing Diseases of the Eye, which owed its origin to his recommendation and exertions. The numerous cures performed by him while he held the situation of surgeon to that charity, were honourable proofs of his surgical skill and attentive diligence in the exercise of his profession. That his labours were at so early a period terminated by the hand of death, is a subject of regret equally to his friends, and to those who anticipated the further improvement of that interesting branch of surgical practice to which he exclusively directed his attention, and on which he employed all his abilities, certainly of no inferior order. It is a satisfaction, however, to know, that there still remain some fruits of his labours, and that the papers he left were capable of being arranged and given to the public by his friend and colleague, who, from the intimacy which had long subsisted between them, and from their having laboured together on the same object, is well able to add to what the author has written, a further account of what he had done.

The short life prefixed to the work contains, as might be expected, few events of much importance or striking interest. The uniform life of a professional man furnishes few materials

for animated description or contemplative reflection; his character is rather to be estimated by the diligence he manifests in the discharge of his professional duties, and by the value of his professional writings. After a classical education, Mr. Saunders was apprenticed in 1790 to a surgeon at Barnstaple, in his native county; from thence he removed at the usual period to complete his studies in the metropolis. At the end of two years, he was appointed Demonstrator of Anatomy at St. Thomas's Hospital, a situation he held, with a very short intermission, till the winter in which he died. The establishment of the infirmary for curing diseases of the eye, in 1804, afforded him an extensive opportunity of treating all the various diseases of this important organ. His attention was particularly directed to, and he was in the habit of practising a successful operation on the congenital cataract, and he appears to have been the first surgeon who had given this disease a distinct consideration, or had viewed it in any other light than as an occasional variety of the disease, which was to be treated precisely by the same means as the cataract of the adult. These means, however, are inapplicable to the condition of infancy, and therefore, the child thus affected, has been consigned to blindness for at least the first eight years of its existence, as a less evil than the hazard of an operation at so tender an age. It is obvious, that a person, circumstanced as was the late Mr. Saunders, with extensive opportunities and adequate abilities, would have it in his power to communicate much valuable information to his brethren of the profession; and the work now produced, while it has been anticipated with much expectation, will be received with great satisfaction, and read with no little advantage. Those parts of the volume necessarily supplied by the Editor, on account of the unfinished state in which the author left his papers, will be found to contain many useful practical observations, obtained from the same source, and during the joint labours of the two colleagues and friends. That this publication had been long in the contemplation of the author, but unavoidably delayed, is evident by the following extract from the Editor's account of his life.

"In the beginning of 1809, Mr. Saunders announced by advertisement, in the Medical Journals, his intention of pub-

lishing a Treatise on some practical points relating to the Diseases of the Eye, and particularly on the nature and cure of cataract in persons born blind. He was so completely occupied with public and private professional duties, that only a small portion of his time, during the summer months, could be devoted to the labours of an author: yet, when it is considered, that not quite five years had elapsed from the establishment of the Infirmary, before his valuable life was closed, it must be admitted, that he was not inattentive to that service, as he had published, during this period, a work on the Anatomy and Diseases of the Ear, and an essay on Inflammation of the Iris, as a specimen of a series which he meant to communicate on the diseases of the eye. In the course of this year, his inquiries on the congenital cataract were nearly concluded; and after the anatomical lectures had closed, he commenced the manuscript of his intended publication. He wrote the Essay on Inflammation of the Conjunctiva in Infants, and on the Cure of the Inversion of the Upper Eye-lid by excision of the Tarsus, which, together with the Essay on Inflammation of the Iris, form the three first chapters of the following work; but he was not enabled even to correct what he had written. The attacks of the disease which proved fatal to him, were now so frequent, the pain of his head so excruciating, that in his intervals of ease, he was so much deprived of the usual energy of mind which had been natural to him, that although he struggled to redeem his pledge, he was unable to accomplish his intention. The editor cannot overlook his notes of cases, taken at this time in a tremulous and sometimes illegible handwriting, without the most painful recollection of his sufferings. But even in this state, he could not be prevailed on, to quit the scene of his hitherto active labours for temporary repose in the country."

For the perusal of those who did not personally know the late Mr. Saunders, we subjoin the following very short but just description of his person and character. " Mr. Saunders was of the middle size, well made, and of an engaging mien. His mind was active, but its original bias was not in favour of the medical profession. Warm in his temper, naturally brave, and enthusiastically fond of whatever was truly British; his wish was to have distinguished himself in the service of his country.

But although he was not led by choice to cultivate surgery, from the moment that he engaged in it, he pursued that line of study which most surely led to professional distinction. He was generous in his private practice, and perfectly unreserved in stating his opinions on the cases submitted to his judgment. In his public practice, he truly deserved the title of a benefactor, for he never would accept any remuneration for his services, although a very liberal one was offered to him by the General Committee of the Infirmary."

The first chapter treats of the purulent ophthalmia of infants, which the author considers to be an erysipelatous inflammation of the conjunctiva. This opinion is founded, not on any precise resemblance of the general appearances or symptoms of this affection with erysipelas of the skin, but on the circumstance of their coinciding in one essential particular, the production of sloughs. That the nature of inflammation is greatly varied, according to the structure of the different parts it attacks, is now generally admitted. In the first attack of the disease under consideration, there is a copious discharge of purulent mucus, similar to what takes place when the mucous membrane of other parts of the body becomes inflamed, as in catarrh and gonorrhœa; how far any advantage is derived from classing differently a disease which so closely resembles the active inflammation of other membranous surfaces in its attack, and which requires for its removal a similar treatment, may be justly questioned. The production of sloughs seems to us rather the effect of the *extension* of the inflammation to a part of different structure, (the cornea) from the mucous membrane first attacked, than characteristic of the *nature* of the primary disease of the conjunctiva. However this may be, the author's description of the appearances and progress of the disease is so accurate, as may be expected from his extensive opportunities of observing it, that we shall give it to our readers in his own words.

"The inflammation commences by a slight redness on the inside of the eyelids, particularly about the inner canthi; they are soon covered with a thin gluey matter, which quickly inspissating, fastens them together, and when they are forcibly opened, a large gush of tears succeeds. The eye-lids tumify

very soon; the viscid discharge increases in quantity, and speedily assumes a purulent form, whilst the tumefaction of the palpebræ increases. The conjunctiva now loses its character, its vascularity becomes extreme, and the minute colourless vessels which nourish its own peculiar texture, are so enlarged and turgid with arterial blood, that the larger branches which run beneath it are totally obscured.

The surface of the conjunctiva is of a beautiful scarlet, and resembles (to use an anatomical illustration) a finely injected fœtal stomach. The swelling of the palpebræ is so great, that when the child cries, the orbicularis muscle projects the morbid conjunctiva, and consequently everts the eye-lids; ejecting at the same time, a considerable quantity of the puriform discharge. As the disease advances, the cornea becomes more or less cloudy, and by the extent of this cloudiness, the degree of approaching slough is marked; for the whole of the cornea, if the whole become cloudy, will ultimately slough, and the form of the eye be totally destroyed. I do not mean to say, that in every instance in which opacity of the cornea is apparent, the cornea is about to pass into a sloughy state; on the contrary, opacity is often the mark of a healthy action commencing around the breach of the cornea, for the purpose of restoring the part, and ought to be hailed as a happy omen. I am now speaking of a peculiar duskiness of the cornea, which begins during the progressive state of the inflammation, which is antecedent to any loss of substance, but is indeed a sure sign that such loss is about to take place. When this duskiness comes on, supposing only a portion of the cornea about to slough, the extent of it in the space of twenty-four hours becomes definite; in the same space of time, it becomes elevated, and apparently lessened in extent; a groove or fissure forms between it and the rest of the cornea; portions of it are carried off by the discharge and tears, or sometimes it separates altogether in one mass. I have several times washed out with a syringe these little sloughs entire.

"But although I am as certain of the fact as the most frequent observation can make me, I am equally sure, that most commonly, when this disease destroys vision, the destruction is accomplished in a more gradual manner, not by a slough of

very considerable extent, and through the whole depth of the cornea at once, but by a succession of sloughs. In other words, the ulcer left by the casting off of the dead piece of cornea, becomes in turn sloughy, and extends itself by a succession of sloughy surfaces, until the last lamina of the cornea sloughs, or being protruded by the pressure from within, ulcerates, and the aqueous humours escaping, the iris passes through the breach of the cornea. Already the whole surface of the eye has been in an ill-conditioned inflammation; the ulcer, or rather the surface of the cornea around the protruding iris, is indisposed to heal; so that more and more of the iris protrudes: this in turn ulcerates, and the crystalline and vitreous humours all issue at the orifice.

"This is the most violent state of the disease, and is less frequent than a more moderate, but still malignant form, in which opacities or small specks are produced by the ulcerative process on some parts of the cornea."

The method of treatment recommended by the author, corresponds with his opinion of the nature of the disease. He objects to the indiscriminate use of stimulant injections; a strict antiphlogistic plan is to be adopted in the commencement of the inflammation; a sufficient number of leeches should be applied as near the eye as possible, so as to produce the effect of general as well as local bleeding. "In the space of twenty-four hours, the danger will be considerably diminished, and the antiphlogistic plan being a little longer continued, the activity of the disease will be subdued; then, by the use of mild astringents, the discharge will gradually cease in the course of a fortnight or three weeks, and the eye will be left free from the most trifling defect."

If, during the continuance of the active inflammation, the cornea grows dusky, the danger is great; it is the unerring harbinger of approaching mortification of the part; yet the mortification may proceed to some extent, and the sloughy part of the cornea be of some depth, without the eye being absolutely lost; if the sloughy part be small, it will only be a case of procidentia iridis, and the major part of which cases, the author shows to be very tractable. The purulent discharge itself is not mischievous to the eye, it is to be considered only

as one of the symptoms of the inflammation, which will subside when the primary disease is removed; but the author allows, that on the decline of the inflammation, the conjunctiva is sooner restored from the ill-conditioned state which protracts the discharge, by the use of astringent injections.

The inflammation of the iris is a very formidable disease, since even when the inflammation does not proceed so far as to affect the other tunics, and cause the eye to be destroyed by suppuration, it is frequently followed by an obliteration of the pupil, or an adhesion of the iris to the capsule of the crystalline lens, leaving only a very minute aperture, which is most commonly occupied by an opake portion of the capsule, or of organized lymph, and the patient is totally blind. On the first attack of the disease, the iris loses its brilliancy of colour, it becomes thickened and puckered, the inner margin is turned towards the crystalline lens, and the pupil is exceedingly contracted. The most active treatment is requisite in the early stages of this complaint, to arrest its progress and prevent its terminating in a permanent adhesion between the iris and capsule of the lens. The application of leeches, mild laxatives, and a simple regimen, the ordinary practice in a common ophthalmia, will be inadequate. In a healthy person, labouring only under this local disease, blood-letting, in a degree sufficient to reduce the pulse very considerably, most active cathartics, and deprivation of solid food, will be barely sufficient to stop its progress. The chief object is to impair the force of the heart, and nothing will more completely accomplish this intention, than the abstraction of blood. After general bleeding has been pushed as far as is prudent, leeches may be applied, and will be found an useful auxiliary. When lymph is deposited between the iris and capsule, it becomes organized, and unites them. The indication, in the management of this state of deposited lymph, is, to effect as much as possible, the dilatation of the pupil, that when the iris shall be fixed to the capsule of the lens, as it certainly will be by the adhesive inflammation, there shall remain a sufficient aperture to transmit light to the bottom of the eye. This purpose will be completely effected by the extract of belladonna, which possesses a remarkable power of dilating the pupil, as is evinced even in cases of

the utmost dilatation attending perfect insensibility of the retina; for, by this substance, a still greater dilatation has been produced. We subjoin the author's account of the modus operandi of this remedy, and a case illustrative of his method of treatment in inflamed iris.

"Now this substance, (belladonna) if properly applied to the eye during the adhesive process of inflammation, will cause the inner margin of the iris to expand and recede from the axis of the pupil, and will thus overcome the restraint arising from the agglutination of lymph, by elongating the organized bands which connect the iris and capsule, if they have not been of long duration. Thus the adhesions are drawn out to a degree of tenuity, and consequently transparency, and a considerable quantity of light is admitted. If the effect of the inflammation has been slight, the adhesions will be trivial, and the pupil only slightly irregular. The iris will retain a certain power of action, and vision will be very little injured. In general the pupil is misshapen, and the iris perfectly fixed; but if the aperture be of sufficient size, and the capsule not rendered too opake, the patient will enjoy a very useful degree of sight. The reader will observe, that in this communication I have been speaking of inflammation of the iris, as of a disease which I have often seen uncombined with any superficial ophthalmia. It must, however, be granted, that generally an inflammation of the conjunctiva, in a greater or less degree, is associated with it; but unless there be deep ulcerations, or sloughing of the cornea, the treatment of the case will not materially vary.

"January 23d, 1806, Mary Skinner, a woman of a plethoric habit, applied at the dispensary, labouring under acute inflammation of the eye. The pupil was contracted, and rendered opake by a deposition of lymph. She was blind on her admission. The temporal artery was divided, and she was otherwise treated on an active antiphlogistic plan.

"On the 31st, The inflammation had subsided, the pupil was a little clearer, and she could distinguish large objects.

"February 5th, The pupil was still contracted as at first. I now applied belladonna: in the course of two days, the pupil was considerably enlarged and oval; and by the exhibition of proper remedies, the lymph occupying the aperture was nearly

absorbed. The iris, however, remains fixed by adhesions, and the pupil does not vary. Her sight is very good."

The author's attention is next directed to an affection which is always distressing to the patient and disagreeable to the beholder; the inversion of the upper eye-lid. Fortunately, the remedy for it is simple and efficacious. This disease is sometimes produced by burns or wounds, but the most frequent cause of it is inflammation. The principal use of the tarsus, according to the author, is to sustain the roots of the cilia on the exterior surface of its ciliary margin, which maintains a given position, and thus enables the hairs to lie in that direction which was intended by nature. It is evident, that the cilia could not sustain themselves on the margin of a flexible substance, acted on by strong muscular fibres; the contraction of the orbicularis would perpetually invert them. The existence of cilia, therefore, necessarily calls for the existence of the tarsus. The insertion of the levator palpebræ is stated to be, (contrary to the opinion of former anatomists, with the exception of Dr. Crampton) into the integuments and conjunctiva. From this circumstance, the author was induced to suppose, that if the tarsus were removed without the destruction of the muscular fibres, these preserving almost entirely their former attachments, no particular shortening of the eye-lid would arise from it; and this actually turns out to be the case; and the deformity produced by the operation is not considerable, when compared with the previous state of disease. The mode of performing the operation is thus described.

"A piece of thin horn, or a plate of silver, having a curvature corresponding with that of the eye-lid, is to be introduced, and its concavity turned towards the globe, within the eye-lid, which is to be stretched upon it. An incision is to be made through the integuments and orbicularis palpebrarum, immediately behind the roots of the cilia to the tarsus, and should extend from the punctum lachrymale to the external angle. The exterior surface of the tarsus is then to be dissected until the orbital margin is exposed, when the conjunctiva is to be cut through directly by the side of the tarsus, which must now be disengaged at each extremity, the only caution necessary being to leave the punctum lachrymale uninjured.

"Nothing can be more simple than this piece of dissection; and if any embarrassment arises, it is from the hæmorrhage of the ciliary artery, which must necessarily be divided; and this hæmorrhage renders it somewhat difficult to observe the punctum, when one wishes to divide the tarsus by the side of it. If the operation itself be simple, the subsequent treatment is still more simple than the operation. In a word, no dressing is necessary, and it is only advisable to cover the eye, to conceal a disagreeable object from the patient's friends. In a few days, an union will have commenced between the section of the integuments and conjunctiva, and the elevation of the skin will go on like that of the original eye-lid, less complete indeed, but sufficiently so, to leave the pupil clear during a moderate elevation of the eye. In all the patients on whom I have operated, a fungus of considerable size has sprouted from the centre of the section. This must of course be managed by caustic or the knife; and the latter is to be preferred, because it excites no subsequent irritation.

"Inflammation of the conjunctiva will sometimes produce an inversion of the inferior palpebra; this may easily be obviated by keeping the eye-lid depressed by means of strips of adhesive plaster. In severe ophthalmias, the conjunctiva becomes much swelled and sometimes protrudes; this being exposed to pressure and friction will thicken, and indurate to a very great degree. In such cases, the author recommends excision of the part of the conjunctiva which is thickened and is the cause of the inversion; after which operation, a compress is to be applied that will carry the orbital edge of the tarsus inwards. This compress will resist for a time the contraction of the orbicularis, and when the cicatrization at the orbital margin is complete, the eye-lid will maintain its proper situation."

In addition to the three complete Essays above noticed, the author had left a great number of notes and cases, which have been brought together and carefully arranged by the editor, and form the remainder of this interesting volume. The fourth chapter is intitled "On some of the more important Terminations of Ophthalmia," and contains a variety of cases and observations in illustration and support of the principles previously laid down by the author. The terminations here men-

tioned are, 1st, by effusion of coagulated lymph; 2d, by suppuration; 3d, by slough; 4th, by ulceration. Had it not been that the editor was desirous to give in the form in which they were found the three first essays, these latter observations of the author might have been incorporated with advantage into the body of those essays, a work which would most probably have been performed by the author, had he lived to commit his labours to the press. Having in the preceding part stated the general doctrines of the author, as contained in the three first chapters, it is unnecessary to enter very minutely into the contents of this; a few points, however, are worthy of attention, and to which we shall now advert. The destruction of vision, when it occurs as a consequence of inflammation of the conjunctiva, is considered by the author as being most frequently produced by sloughs, or ill-conditioned ulcers of the cornea. This opinion leads to a practical indication of much importance; that, although during the continuance of acute inflammation, evacuations are to be employed proportioned to the intensity of the inflammation and the strength of the patient; yet, when the inflammation has lapsed into ill-conditioned ulceration, or more especially into slough, cinchona is to be freely administered to support the prostrate powers of the system. This practice is recommended both in the infant and the adult, and the propriety and success of the treatment is enforced by several cases, from which we extract the following:

"Sept. 19, 1806, Thomas Green, a middle-aged man, applied with a violent inflammation of both eyes, and bore in his hand a handkerchief stained of a straw colour with the discharge that issued from the eye-lids; the conjunctiva was highly red and villous, no distinct vessels being visible on that of the palpebræ, and to a certain degree they were obscure on that of the eye-ball; the pain was by no means great; the inflammation came on suddenly, with a sensation of grittiness, five or six days previously to his application. Twelve ounces of blood were taken from his arm, and he was directed to take purging powders of calomel and jalap, on the 19th and 20th.

"21st, Morning. The cornea of the right eye, which, on the 19th was slightly opake at three different places, now presented three distinct ulcerated surfaces, clear grooves, almost

through the cornea. The iris and anterior chamber were perfectly free from change. Four leeches were applied to the right palpebræ and three to the left, and a purging draught was ordered. Evening; the inflammation of the left conjunctiva had decreased, and the puriform discharge was less. The right remained in the state described in the morning. Four leeches were applied.

"22d, Morning. Four leeches were applied to the right palpebræ, and a dose of a cathartic mixture was given every four hours. Evening; three leeches were applied.

"23d, The ulcers were apparently filling up.

"24th, The ulcers were overlapped by the conjunctiva. A purging powder was prescribed for him.

"25th and 26th. The ulcers were filling up; the cathartic was daily repeated.

"27th. The inflammation was increased in a slight degree; leeches were applied to the palpebræ, and a dose of ol. Ricini was given. Evening; the inflammation was rather mitigated.

"29th. One of the pits was a little deeper, others were stationary.

"From the 29th of September to the 7th of October, the ulcers were stationary and without vigour; during this time he took a laxative every other morning.

"Oct. 7th. Observing that the pulse was languid and small, and that the process of restoration did not go on with sufficient celerity, I resolved on giving the cinchona.

"8th. Two drachms of the extractum cinchonæ, dissolved in equal parts of aq. menth. pip. and aq. ammoniæ acet. were taken in twenty-four hours.

"10th. The same medicines had been continued; the improvement was remarkable and decisive; the ulcers were healing through their whole extent. I increased the extractum cinchonæ to three drachms daily.

"11th. The ophthalmia had ceased, and the ulcerated groove was filling up fast.

"Nov. 10th. The ulcers were quite healed, and his vision was perfect."

In the fifth chapter are given a few histories, illustrating some of the more important changes of structure in the eye;

these are accompanied by plates, showing the various stages of disorganization of the organ of vision, in cases where the structure of the eye is changed by the growth and protrusion of fungous tumours, either of a malignant nature or otherwise. A few observations are premised on the combination of amaurosis with cataract, generally an incurable disease, and which it is of importance to distinguish from simple and uncombined cataract, with which, in its incomplete state it is often confounded. The diagnostic signs of this species of amaurosis are, "a pupil somewhat dilated and still, or sluggishly contracting over a yellowish lens, even in a strong light, with a tendency in the vessels on the anterior part of the globe to assume a fascicular arrangement." In one form of amaurosis depending on organic affection, the pupil is not only motionless, or nearly so, but it is also contracted and irregular, and the humours are misty; this is said to be the most common form of the disease. The cases of malignant fungi here recorded, afford additional evidence of the incurable nature of this disease; in no one instance was even the extirpation of the eye attended with complete success or the disease radically cured.

The treatment of congenital cataract has been so materially improved by Mr. Saunders, that a great part of his justly acquired reputation has been obtained by his success in operating on cases of this description. In chapter the sixth and last, we are presented with many observations on this disease, a description of the operations employed by the author for its relief, and the general result of his practice. In the congenital cataract the lens is most frequently either partially or completely absorbed, and the cataract is purely capsular; to effect, therefore, a permanent aperture in the centre of this membrane is the requisite business of art, and applies, indeed, to every case of congenital cataract which can occur. From June 1806 to December 1809, sixty cases were submitted to the author's care; the following table contains a statement of the appearances noted in forty-four of these cases, and exhibits their proportion to each other.

"Solid opake lens, with or without opacity of the capsule, three single, two double cataracts - -	5	"Fluid cataract, with opacity of the capsule, two single - - - - -	2

"Solid lens, opake in the centre, transparent in the circumference, with capsule in the same state, five double - - - - - 5

"Fluid cataract, with opacity of the capsule and closed pupil, two double - - 2

"Soft opake lens, with or without opacity of the capsule, two single, two double - - - - - 4

"Opake and thickened capsule, the lens being completely absorbed, or the remains of it being thin and squamose, six single, twelve double - - - 18

"Soft opake lens, with solid nucleus, one single, two double - - - - - 3

"Opake and thickened capsule, with only a very small nucleus of the lens unabsorbed in the centre, two single - - - - - - 2

"Soft opake lens with dotted capsule, the spots white, the spaces transparent, two double - - - - - 2

"Opake and thickened capsule in the centre, remains of the lens in the circumference, one double - - 1

It is a very curious and affecting fact, observed by the author, that this disease, in many instances, attacks successively the children of the same parents. He mentions that two brothers, between whose ages there was a difference of six years, were both affected with congenital cataracts. In a second family, two brothers, twins, became blind with cataracts at the age of twenty-one months, each within a few days of the other. In a third family, a brother and two sisters were born with this disease; the eldest sister was affected with it only in one eye; the brother and youngest sister in both eyes. In a fourth family, three brothers and a sister had all congenital cataracts. It is remarkable that the same character was preserved in the cataracts of several children of the same family.

The excessive mobility of the eye, the unsteadiness of the little patient, the small field for the operation, and the flexibility of the opake capsule, are the difficulties with which the surgeon has to contend. These obstacles were all overcome by the author in his method of performing the operation. He was accustomed to dilate the pupil by means of belladonna, and employed a diminutive needle, armed with a cutting edge from its shoulders to its point, and thin enough to penetrate with

the most perfect facility. The operation employed by the author for the cure of congenital cataract, was neither the extraction of the lens, as usually performed, nor the depression of it, as in couching; it was an *operation on the capsule*, founded upon the knowledge that Nature herself always endeavours to remove the opake lens, but is inadequate to overcome the opacity of the capsule. The mode of performing the operation must be varied according to the state of the parts concerned in obstructing vision. Ample directions are given for the method of proceeding under the different circumstances of disease, the operation being distinguished into the anterior and posterior, according as the cornea or sclerotica is to be pierced. "The number of operations which may be necessary to accomplish the cure of a congenital cataract will very much depend on the texture of the capsule, and the size of the lens. It is frequently cured by a single operation, more frequently it requires two, often three, sometimes four, but very rarely five. The period of cure will of course depend on the same circumstances. Some are cured in a few days, the greater number in one or two months; in many the process is protracted to three; and in a few to four, or even five months."

The following is stated to be the total result of the author's operations on the congenital cataract. In sixty patients he succeeded in giving sight to fifty-two. In thirteen of them he operated on single eyes. In two of these, one of whom was an idiot, a pupil of each was completely cleared; but the retina being insensible, the operation was not attempted on the other eyes. In a third the result is not noted, except that he considered it a hopeless case when the operation was tried. A fourth was altogether unmanageable, being not only afflicted with congenital blindness but also deafness. In a fifth the eye was lost by suppuration. In the remaining eight he was successful; of these, five had each previously lost an eye; one by variola, and four by operations performed by other surgeons; three resulting from attempts to extract. In forty-seven patients he operated on both eyes. In one of these, who was an idiot, no vision was obtained, although a permanent aperture was made in each capsule. In a second, the operation was completely successful on one eye, but failed in the other by the superven-

tion of acute inflammation, which closed the pupil with lymph. In a third, the operation proved unsuccessful in both eyes, by the same result as the last, a closed pupil from adhesive inflammation. In a fourth, the consequent inflammation passed into suppuration, but the other eye was cured. Two were under care at the time of his death, one of whom was already cured in a single eye. Forty-one were cured in both eyes.

These operations were performed on patients at the following ages: five from two to nine months; nine from thirteen months to two years; four from two and a half to three years; five from three and a half to four years; eight from four to six years; seven at seven years; eight from seven to nine; ten from nine to fifteen; four from twenty to twenty-eight. Notwithstanding thirty-eight of these patients were at the interdicted age, it is observed, that the operation failed in only two of them; in one, at the age of three years and a half, who had an insensible retina, and was an idiot; in the other, at the age of seven years, by adhesive inflammation.

The operation on the capsule, although the only one which is suited to the child, is not necessarily confined to that age; it is no less applicable to the cataract of the adult. The inconveniences attending this operation in the adult arise from the circumstance of a more frequent occurrence of acute inflammation. In the ordinary cataract of the adult, the lens is comparatively hard and slow of solution, especially its nucleus or central part, and when it loses the support of the anterior lamella of the capsule from the extensive division of that membrane, it is apt to revolve on the instrument, or, by a partial dislocation, to produce a permanent pressure on the iris. Inflammation rarely followed the operation in the capsular cataract; in the lenticular the inflammation was in proportion to the irritation or pressure which the iris sustained. To diminish the risk of inflammation, therefore, while the lens should be subjected to the action of the aqueous humour, in which it is soluble except when in an ossified state (a rare disease), was the grand point to be attained. With this view the author considerably reduced the size of his needle, and performed the operation rather differently than he had formerly done. He made an aperture in the centre of the capsule, not exceeding the ordinary size of the

pupil. "Thus, whilst the opening was large enough to subject the lens to the action of the aqueous humour, *a sufficient portion of the circumference of the interior lamella of the capsule was preserved to confine the lens in its seat.* The lens itself he used tenderly, working a little at its centre with a lateral motion of the needle, which is by far the safest method of opening its texture. Sometimes the touch with the instrument was directed backward, to avoid the slightest pressure on the iris. He was now content to obtain, by several operations, what in his first method of proceeding he had gained by two."

Whether the advantages derived from the capsular operation, recommended by the author, render it superior to those commonly hitherto employed, the extraction or depression of the cataract, is a question which must be left for the future decision of surgeons, who shall make trial of them respectively. If it shall appear that a more frequent or more permanent cure is obtained, although this be more slowly accomplished than in either of the other methods, it will deserve to be preferred to those; and may, in no long time, almost supersede them. In the adult, it is said, if the texture of the lens is nearly uniform and permeable, the cure is completed in a space of from three to five months; but if the texture is firmer, and the nucleus large, the cure cannot be accomplished in less than seven months. The author himself had not finally made up his mind, whether, in cases where the texture of the lens was unusually hard, extraction was not the preferable operation in the hands of the surgeon, who, like himself, could perform that operation with dexterity; with respect to the softer lens, or the capsular cataract, he was satisfied of the superiority of his operation. The excellence of this operation is confirmed by the experience of Dr. Travers, the successor of the author in the Infirmary; who, since his appointment, we are informed, has cured by it forty-seven patients; and although many of these were cases of congenital cataract, the majority were cases of ordinary cataract in the adult, in whom the lens was frequently of a firm texture.

The following cases of congenital cataracts, successfully treated by the author, we give in his own words:

"Elizabeth Angier, born blind with cataracts, was submitted to the operation at the age of two years and two months.

"Nov. 8th, 1807. I operated on both eyes. The cataracts were chiefly membranous and tough. The capsule was opened extensively in the left eye, and little less in the right.

"21st. The right capsule had re-united, but a considerable absorption of its contents had taken place. In the left eye the remains of the lens was concave, and the rent in the capsule had not coalesced. The operations were repeated. In the right eye I opened the capsule extensively, but exactly in its center. A large portion of it was very dense and opake. In the left a small nucleus was detached, and pushed through the pupil, leaving it clear.

"22d. The pupil of the left eye continued clear, and the small nucleus lay in the anterior chamber without exciting ophthalmia. This right capsule remained open.

"28th. No ophthalmia followed the operations. She saw with the right eye, although in the upper part of the pupil a large portion of the capsule remained. The nucleus in the left wasted fast.

"Dec. 6th. The operation was repeated in the right eye, and the lower part of the capsule was lacerated, but she disengaged her head, and I was obliged to withdraw the needle without detaching the capsule to the extent which I had intended.

"7th. The inflammation was slight, but some adhesions of the capsule to the iris were about to take place. The belladonna was applied.

"12th. An absorption of all the lower part of the cataract in the right eye had taken place. The nucleus in the anterior chamber of the left eye was almost gone.

"Jan. 4th, 1808. Both eyes were cured."

Contrary to the usual practice of book-making, wherein a very small quantity of new matter is sparingly diffused through several extensive volumes, we have here a large mass of valuable information, concisely related in clear and perspicuous language; although a number of well engraven and beautifully coloured plates necessarily render the work rather expensive.

ORIGINAL PAPERS.

Account of a new Mode of extracting Poisonous Substances from the Stomach. By PHILIP S. PHYSICK, M. D. Professor of Surgery in the University of Pennsylvania.

ON Thursday 6th June, 1812, I was sent for in much haste at nine o'clock in the evening, to visit two children of Mr. S. B. each three months old. They were twins, and had been affected with hooping cough for several weeks. The mother informed me that in consequence of her children having been very restless the night before, she had this evening given them some laudanum. To William she had given one drop at seven o'clock, and the same dose to Edmund forty minutes afterwards.

I found William in a state of stupor or very profound sleep, from which he could not be roused, and was informed, that just before my arrival, his whole body had been strongly convulsed; his breathing was laborious and his pulse feeble and slow. On inquiry, I found that the vial out of which the drop of laudanum had been given, had contained, several weeks before, nearly one ounce of that medicine, but having been left without a cork, it had dried away so much that one drop only could be obtained for William; in order to procure another drop, two drops of water had been put into the vial and stirred about, by which another drop had been obtained and given to Edmund, forty minutes having intervened between the two doses.

About a quarter of an hour before my visit, the mother had given to William fifteen drops of antimonial wine, but as it had produced no effect I prescribed an emetic of ipecacuanha, and directed it to be given immediately; this however was found impracticable, as the child was incapable of swallowing.

At half past nine o'clock, Edmund, who had appeared to be in a very easy sleep, became convulsed, and his pulse and breathing were affected in the same way that his brother's had been. We attempted to give him ipecacuanha, but could not

make him swallow it. The countenances of the children became livid,—their breathing very laborious; with long intervals between the times of each inspiration, and the pulse in each very feeble.

Under these circumstances it clearly appeared no time was to be lost, and therefore, as they could not swallow any thing, I determined to inject an emetic into their stomachs. For this purpose a large flexible catheter was passed through the mouth down the œsophagus into the stomach, and through this, one drachm of ipecacuanha mixed with water was quickly injected by means of a common pewter syringe. In hopes that the emetic would operate, I waited some time without any effect being produced. William exhibited now every symptom of speedy dissolution,—his face became very livid;—the pulse and respiration had almost ceased; and indeed the pulse could not be perceived, except a faint stroke or two, after that kind of imperfect and convulsive inspiration which is commonly observed in children just before actual death, accompanied with a convulsed action of the muscles of the mouth and neck. In this situation I passed the catheter again, and by applying the syringe to its projecting end, drew up the fluid contents of the stomach, and immediately injected warm water which was again withdrawn.* These operations were alternated two or three times, but when completed no sign of life remained. Hopeless as the case now appeared, I injected some spirit† and water mixed with a little vinegar through the catheter;—in less than one minute the child again inspired, the pulse became perceptible at the wrist, and in four minutes, with the aid of external stimuli, both went on so perfectly that there was every reason to believe the child would recover.‡

* The idea of washing out the stomach with a syringe and tube, in cases where large quantities of laudanum or other poisons had been swallowed, occurred to me at least twelve years ago, and I have constantly, for many years, recommended it in my lectures. In the year 1809, Dr. Dorsey performed the operation of washing out the stomach in such a case, but the patient had taken the poison twelve hours before he was called, so that he did not succeed. ☞ Since writing the above, I have been informed that in an European journal, a French surgeon has lately proposed injecting the stomach. My informant has unfortunately mislaid the pamphlet.

† See Medical Repository, volume 5, page 347.

‡ It might be suspected, that the catheter passing through the fauces,

By the time that these operations were performed on William, Edmund was observed to have passed into the same condition of apparent death, from which his brother had just recovered. The same measures were adopted in his case, and with the same happy effect. I now flattered myself that the children would do well, but in this expectation I was disappointed. In about half an hour, Edmund's breathing became very slow and laborious, and his pulse which had before been very much excited became so feeble, that he appeared to be sinking very fast. Supposing that the effects observed, might be produced by the spirit which had been given, occasioning intoxication, I determined to extract it from the stomach and to inject warm water, removing it again. This operation was very quickly performed, but at the conclusion of it I was much distressed by seeing the little patient to all appearance lifeless. Observing in this case, that the actions of life ceased so immediately after the extraction of the spirit, I determined to try it again, and injected a little weak brandy and water. In less than a minute this occasioned a repetition of breathing and of the action of the heart, and in about five minutes both were regularly performed. The symptoms of ebriety took place also in William, but observing that his brother had been nearly lost by extracting the spirit from his stomach, I did not attempt the removal of it in William's case.

Doctor Austin who kindly assisted me on this occasion, remained all night with my little patients. He informed me, that after some time they became better, though they both had slight convulsive motions occasionally through the night. Their bowels were moved several times by castor oil. After five o'clock in the morning Edmund had no convulsions, but they continued with William until twenty-five minutes after nine, when he struggled a little, sighed, and expired. Edmund was troubled for two or three days with a diarrhœa, but soon recovered completely.

would endanger suffocation from its situation over the top of the larynx, but this was not the case, because the children recommenced breathing before the instrument was removed. I found also with my finger, that the instrument rested on one side or other of the epiglottis, so that it could not obstruct the glottis.

Two Cases of Simple Fracture, in which Ossific Union was promoted by the Use of Caustic Issues. By JOSEPH HARTSHORNE, M. D. one of the Physicians of the Pennsylvania Hospital.

IN the year 1805, a case of simple fracture of the external condyl of the os femoris was placed under my care. As no bony union had taken place four months after the accident, an attempt was made to increase the action of the vessels, by rubbing the fragments against each other. The patient was confined to his bed, and the limb was kept in the extended position and in a state of rest, by means of splints and bandages. This treatment was continued three weeks without producing any advantage. The use of a seton, which had succeeded so well in the practice of Dr. Physick, was in this case inadmissible, as it could not have been introduced without wounding the capsular ligament of the knee joint. A large issue was made by applying caustic potash to the integuments immediately over the injured part. In about twenty days the fragments became firmly united.

ANTHONY HAMMOND aged twenty-four years, had his right os humeri fractured on the 22d January 1811; and requested my advice on the 17th June of the same year. The extremities of the fragments passed each other about two inches, forming an artificial joint a little below the insertion of the deltoid muscle. As his maintenance depended upon daily labour, the man was extremely anxious that some attempt should be immediately made to restore the use of his arm. An issue three inches in length and one inch in breadth, was made in the integuments by means of lapis septicus near the place of fracture. The patient was at the same time informed, that if this practice should not be successful, the introduction of a seton between the fragments, would still afford some hope of recovery, and be attended with less danger in the autumnal and winter months, than during the heat of summer.

Ten days after the application of the caustic, the os humeri became considerably enlarged.

A bandage was now passed round the whole arm, beginning

at the hand, and splints were applied to the fracture so as to make firm compression. On the 7th of July, twenty days after the caustic had been used, the process of union had commenced. The patient complained of pain in the whole arm; the bone had become enlarged to more than twice the natural size, and there was much less motion of the fragments when an attempt was made to raise the limb.

The issue was kept open, and the application of splints and bandages was continued until the 22d August. At this time no motion whatever could be perceived in the place of fracture, and the man could easily move his arm in every direction. Early in September, as a slight degree of motion was perceptible, the caustic was again applied so as to produce an issue, which was kept open two weeks.

A considerable enlargement of the os humeri again succeeded the use of the caustic. A very obscure degree of motion could still be observed by careful examination.

The patient was dismissed about the middle of September, with a request that he would call on me in the course of a few weeks. Three or four days after leaving me, he entered on board a vessel bound to Europe. On the passage he was impressed into the service of the British frigate Belvidere.

He arrived in this city in September 1812, and informed me that he had been able, during the whole of the time he remained on board ship, to perform the most laborious part of a sailor's duty.

Philadelphia, Sept. 23d, 1812.

MEDICAL INTELLIGENCE.

Communications relative to the Datura Stramonium, or Thorn Apple: as a Cure or Relief of Asthma: addressed to the Editor of the Monthly Magazine; several of them never before published. Lond. 1811. pp. 90.

[From the Edinburgh Medical and Surgical Journal, for July 1812.]

It is a trite observation, that on the introduction of new, or revival of neglected remedies, two opposite faults are frequently committed. By some they are extolled for powers which they do not possess, while others deny them all virtues; and it is seldom, until after repeated fluctuations, that their real value is at last ascertained and generally admitted.

The subject of this treatise furnishes a striking example of the truth of these remarks. Stramonium was for a short time extolled as an almost infallible remedy in the cure of mania and melancholia, and then fell into total neglect. Once more it has become fashionable, for the cure of a totally different disease, and its newly ascribed powers are still a matter of keen controversy.

The first public notice of these was in a letter to the editor of the Monthly Magazine, signed *Verax*, but now acknowledged by Mr. Sills, a respectable merchant in London, who had derived great benefit from its use. The history, however, of its introduction, is very concisely detailed in the following letter, from Dr. Sims of Guilford Street.

"Some time in the year 1802, I received from General Gent a remedy that he had, not long before, brought from Madras, which, the general informed me, was used there as a specific for relieving the paroxysm of asthma, and that it was prepared from the roots of the wild purple-flowered thorn-apple (datura *ferox*.) The roots had been cut into slips as soon as gathered, dried in the shade, and then beat into fibres resembling coarse hemp. The mode of using it was by smoking it in a pipe at the time of the paroxysm, either by itself or mixed with tobacco, according as the patients were previously addicted to smoking or not. General Gent procured this remedy from Dr.

Anderson, physician general at Madras, who both recommended it, and, I believe, used it himself.

"I happened at this time to be attending the daughter of an eminent physician, labouring under phthisis pulmonalis, combined with asthma, as appeared to me from the frequent paroxysms of difficulty of breathing, not usual in pure phthisis, at least in so early a stage of the disorder. With a view of alleviating these distressing paroxysms, I recommended a trial of this remedy, which to me was at that time perfectly new. The relief obtained was far beyond expectation, and, although gradually sinking under an incurable disease, this amiable lady continued to experience great satisfaction in its use, almost to the fatal termination.

"Soon after this, meeting with Mr. Toulmin, surgeon of Hackney, at a time when he was much harassed by frequent paroxysms of asthma, under which he had been suffering for several years, I recommended the same remedy to him. He received so much benefit from its use, that I gladly transferred all the remedy that I had left to him. But the quantity not being sufficient to last long, he was obliged to have recourse to our common thorn-apple (datura stramonium,) of which I had advised him to try the stalks, as the roots of this species are small and fibrous. Mr. Toulmin experienced nearly the same relief from this as from the East India plant: he likewise tried the leaves, but could hardly distinguish these from tobacco, either in taste or effects. From Mr. Toulmin, the knowledge of this remedy was communicated, among others, to your correspondent (Mr. Sills.)

"I have two purposes to answer by the above communication. In the first place, it will serve to point out the history of the introduction of a remedy which promises to become an important addition to the materia medica; not that I can claim any merit from the share that I have accidentally had in it; but the principal intention I have had in view, was to show that the original remedy, as used in the East Indies, is not exactly the same as what is used here. It is indeed highly probable that both species have nearly similar virtues, but the one may perhaps be more efficacious than the other. It is to be hoped that prepared roots will be imported from Madras, in order that

such patients as may not have experienced the promised relief from smoking the stalks of Datura Stramonium, may have an opportunity of trying whether the roots of Datura Ferox may be efficacious.

"More care ought to be taken in the preparation of the stramonium than is usually done. The stalks ought to be cut into slender slips while recent, and dried quickly. In our climate the general direction of drying in the shade is injurious to most herbs; the quicker they are dried the more they contain of the taste and colour, and consequently of the virtues of the fresh plants. I observe, that, of late, the whole plant is sold in the physic herb-shops, as a remedy for the asthma. Now it ought to be generally known that the leaves, and more especially the unripe capsule and seeds of the thorn-apple, are a very powerful, nay, even a deleterious narcotic, if taken internally, and probably cannot, in all cases, be even smoked with impunity. Yet the leaves, according to the experience of Mr. Toulmin himself, are not possessed of the same powers, in allaying the asthmatic paroxysms, as the comparatively mild and innocent stalks and roots."

We shall now make a few quotations from the cases contained in these letters. Mr. Sills first describes the symptoms of his asthma, and the effect of the stramonium upon him, and his manner of using it.

The asthmatic paroxysm usually came on about two o'clock in the morning, when I was suddenly surprised from sleep with violent convulsive heavings of the chest; and I was scarcely allowed time to place myself upright in a chair, where I sat resting myself upon my elbows, and with my feet upon the ground (for I could not bear them in a horizontal posture,) before I underwent a sense, as it were, of immediate suffocation. The fits generally continued, with short intermissions, from thirty-six hours to three days and nights successively; during which time I have often, in the seeming agonies of death, given myself over, and even wished for that termination of my miseries.

An amiable friend and most respectable surgeon at Hackney (Mr. Toulmin,) first persuaded me to smoke the divine

Stramonium, to which I owe altogether my present freedom from pain and renewed capacity of enjoyment.

It is the root only, and lower part of the stem of this plant, which seem to possess its anti-asthmatic virtue: these should be cut into small pieces, and put into a common tobacco-pipe, and the smoke must be swallowed, together with the saliva produced by the smoke; after which the sufferer will, in a few minutes, be relieved from all the convulsive heavings, and probably drop into a comfortable sleep, from which he will awake refreshed, and, in general, perfectly recovered: at least, this is the invariable effect produced upon myself. He should, by all means, avoid drinking with the pipe, a too ordinary accompaniment of smoking.

I once took some brandy and water with the pipe, but it proved a very improper combination: a dish of coffee, however, I often take after it, and find it highly refreshing. I should mention that strong coffee has frequently been recommended to me, but never produced any beneficial effect as a cure for asthma.

This plant is delightfully fragrant: and although it has been regarded hitherto as of a poisonous nature when taken inwardly, yet I have smoked a dozen pipes at a time, without experiencing from them any other inconvenience than a slight excoriation, or soreness of the tongue.

Dr. Reid says, that, in several other instances of similar disease, the success has been equally remarkable and complete. Mr. Willis of Bristol states its success in his own case; likewise Mr. Young of Aberdeen. Wr. Woodrow of Norwich states, that he has smoked the stramonium since last September, and almost invariably experienced great relief in respiration; but he did not find that it diminished the daily accumulations of phlegm. Mr. Radborn of Alveston in Derbyshire, a septuagenarian, was also greatly benefited by it; but it must be remarked that he used the stalks and seed vessels. The last testimony in favour of the stramonium which we shall notice, is in the following letter from Mr. Sills.

"You are at perfect liberty to make every use of my name respecting the stramonium you think proper, and may add, that I continue to derive increased good effects from the use

of it. In truth, the asthma is destroyed! I drink beer, eat of every thing; and if my mind was as free from perplexity as my body is from asthma, I should again enjoy my existence. I never experienced torpor or any ill effect whatever; and I would rather be without life than without stramonium."

This evidence, though far from decisive, is sufficient to entitle the stramonium to a fair and varied trial, under the superintendence of attentive practitioners. Of the activity of many parts of the stramonium, there are unfortunately too many proofs on record, and we fear that its indiscriminate use as a popular remedy may be attended with danger, especially as we well know that the leaves and seed-vessels, and even the poisonous seeds, are often used instead of the principal stalk, which is the part specially recommended, and is *said* to be comparatively mild and innocent. We should also think that the direction given to swallow the saliva excited by inhaling its smoke, ought to be followed with great caution. From the analogy of tobacco, we should fear that it would be extremely apt to derange the stomach, for we know that experienced smokers carefully avoid swallowing the saliva impregnated with the condensed fumes of the smoke. Besides, we consider the novelty and advantage of the practice of *smoking* stramonium, to consist in applying the remedy directly to the seat of the disease. The coloured engraving, said to represent the *Datura Stramonium* in flower, is execrable, and gives no idea of the plant. It is easily cultivated, like any other hardy annual.

Letter from Sir John Sinclair, Bart. *to the President of the College of Physicians, at Edinburgh, on the Remedy lately discovered for Calculous Complaints.*

[From the London Medical and Physical Journal, for July, 1812.]

SIR,

I am persuaded that you will concur with me in opinion, that there are no complaints incident to mankind, for which it is more desirable to discover a cure, or even a safe and effectual means of prevention, than those of a calculous nature. The miseries felt by those who are afflicted with the stone or

gravel, are dreadful beyond description; and any cure effected by surgical operation, is not only of a nature peculiarly severe, and often fatal, but does not always prevent a repetition of the complaint. It is with much pleasure, therefore, that I call the attention of the respectable body over whom you preside, to the means which have been recently discovered, by which calculous complaints may, there is every reason to hope, be prevented from proving, in future, so formidable a source of human misery.

The paper printed in the Philosophical Transactions, An. 1810, entitled, "Observations on the Effects of Magnesia in preventing an increased formation of the Uric Acid," written by Mr. William T. Brande, is the first suggestion, so far as my information reaches, that has been published, recommending magnesia as an antidote to the formation of stone or gravel.

The inquiries of that eminent surgeon, Mr. Home, into the functions of the stomach, and his discovery that liquids pass from the cardiac portion into the circulation of the blood, (Philos. Trans. April 1808,) led him to consider that the generality of calculous complaints might possibly be prevented, by introducing into the stomach such substances as are capable of preventing the formation of uric acid; and that this mode of treatment would have many advantages over the usual method, which consists in attempting to dissolve the uric acid after it is formed.

He consulted, it would appear, Mr. Hatchett, on the substance most likely to produce this effect; and that respectable chemist concurred with him in opinion, that magnesia, from its insolubility in water, was peculiarly well adapted for the purpose, as it would remain in the stomach, until it should combine with any acid, or be carried along with the food to the pylorus.

These gentlemen, anxious to have a complete investigation of a subject so peculiarly interesting, requested Mr. Brande to assist them in the prosecution of it; and many opportunities having occurred of carrying on the inquiry, during an attendance on patients afflicted with calculous complaints, the results of their joint labours were communicated to the Royal Society, in the important paper I have alluded to, which is earnest-

ly recommended to the consideration of every medical person, who may have patients afflicted with such complaints under his care.

As calculous matters are not uniformly of the same description, it is certainly desirable to ascertain, by the assistance of some medical person, the specific nature of the complaint with which any individual is afflicted; but, being anxious that those who are at a distance from medical aid, or who cannot, perhaps, afford to procure it, should be able to avail themselves of this new discovery, I took the liberty of applying to Mr. Brande for a short statement of the manner in which the remedy ought, in general, to be applied; and he, with that liberality which belongs to true genius, has furnished me with the following particulars.

"The best method of giving the magnesia is in plain water, or milk, to be taken in the morning early, and at mid-day. If the stomach is weak, and this produces flatulency, or uneasy sensations, some common bitter, such as gentian, may be taken with it: if it purges, a little opium may be added.

"The mode in which magnesia operates in preventing the formation of stone or gravel, Mr. Brande believes to be, by preventing the formation of acid in the stomach.

"Where there is a stone actually formed in the bladder, it is of advantage (if the case is a proper one for the use of magnesia) by preventing its increasing in size.

"The dose of magnesia must entirely depend upon the circumstances of the case—*generally*, five grains, twice or thrice a day to children below ten years of age; fifteen and twenty grains to adults.

"Mr. Brande has always given common magnesia. The calcined may occasionally be used with advantage. Any omission of the remedy for a time must entirely depend on the state of the patient.

"In regard to diet, no particular regimen is necessary. Animal food may be taken in the same quantities, and of the same sorts as usual. The patient should avoid strong wines, such as Port and Madeira, and indeed should abstain from pure wine altogether. Spirits should not be taken in any form. Lemons and vinegar need not be absolutely avoided, unless the bowels

are too open. Oranges and other fruits, when ripe, may be taken."

There is every reason to hope, from the success that has already attended the application of this remedy in various cases, that it may prove an effectual means of preventing the greatest proportion of calculous complaints; and it is impossible to foresee, to what a state of improvement it may yet be brought, in the course of further experience, when the attention of a number of able and learned men (as I trust will be the case) is directed to its application.

Perhaps there is no disorder to which mankind is liable, for which nature has not provided some remedy, or at least some means of alleviation, though, in both respects, much remains to be learnt; and any discovery that can be serviceable in calculous complaints, from the infinite distress they occasion, must prove, in a peculiar manner, gratifying to every real friend to the happiness of the human race.

I have the honour to be, Sir,

Your humble and obedient servant,

JOHN SINCLAIR.

27, *Old Burlington-Street*, *May* 7, 1812.

P. S. Since this letter was written, I have met with another interesting paper, containing some valuable hints regarding the Cure of Gravel.* Instead of soda-water, or the *aqua mephitica alkalina*, the author recommends, for adults, the following medicine: "a drachm, or two scruples, of mild vegetable alkali, otherwise called salt of wormwood, or salt of tartar, dissolved in two ounces of water, sweetened with two drachms of honey, to be taken with half an ounce of lemon-juice three times a-day." On this medicine it is to be observed—1. That honey is serviceable in calculous complaints, and is preferable to sugar. 2. That the use of honey renders any opening medicine in general unnecessary, even when opium, as is subsequently recommended, is administered. 3. That, according to the above plan, more alkali is given than the stomach could

* Entitled, "On the Effects of large Doses of mild vegetable Alkali, or Potassa Carbonata, in Gravel, and the beneficial effects of Opium combined with it." By Gilbert Blane, M.D. Physician to the Prince of Wales.

otherwise bear. 4. That though the virtue of a large proportion of the alkali is probably impaired by the addition of the acid, yet that this is more than compensated by its accommodating the stomach to large doses of the alkali. 5. That the mischievous effects on the stomach, which so often take place from the use of the alkalies alone, are thereby prevented.

Where there is much pain combined with inflammation, bleeding may be necessary, or the addition of nitre to the saline draught; but where there is much pain, without the suspicion of inflammation, opium is highly advisable, in the proportion of from five to ten drops of laudanum, to each dose of alkali. The cure is thus rendered more expeditious, more certain, and more permanent. Indeed one of the principal objects of this tract alluded to, is to inculcate, from the author's experience, that the addition of opium gives greater certainty and permanency to the cure.

It may be further remarked, that, as there is a great variety in cases and constitutions, and as it appears by chemical analysis, that calculous concretions vary in the nature of their component parts, so must the remedies, according to these diversities. There are few cases, however, in which either this or the preceding plan of cure may not be successfully applied.

Curious and Interesting Experiment.

[From the Philosophical Magazine, for April 1812.]

A Edinbu gh, Professor Leslie has just succeeded in freezing quicksilver by his frigorific process. This remarkable experiment was performed in the shop of Mr. Adie, optician, with an air-pump of a new and improved construction, made by that skilful artist. A wide thermometer tube, with a large bulb, was filled with mercury, and attached to a rod passing through a collar of leathers, from the top of a cylindrical receiver. This receiver, which was 7 inches wide, covered a deep flat bason of nearly the same width, and containing sulphuric acid, in the midst of which was placed an egg-cup half full of water. The inclosed air being reduced by the working of the pump to the 50th part, the bulb was repeatedly dipt in the water,

and again exposed to evaporation, till it became incrusted with a coat of ice about the 20th of an inch thick. The cup, with its water still unfrozen, was then removed, and the apparatus replaced, the coated bulb being pushed down to less than an inch from the surface of the sulphuric acid. On exhausting the receiver again, and continuing the operation, the icy crust at length started into divided fissures, owing probably to its being more contracted by the intense cold than the glass which it invested; and the mercury having gradually descended in the thermometer tube till it reached the point of congelation, suddenly sunk almost into the bulb, the gage standing at the 20th of an inch, and the included air being thus rarefied about 600 times. After a few minutes, the apparatus being removed, and the bulb broken, the quicksilver appeared a solid mass which bore the stroke of the hammer. The temperature of the apartment was then 54° of Fahrenheit.

In another experiment, with a small spirit of wine thermometer, under the same circumstances and the same degree of rarefaction, the cold produced was found to be $70\frac{1}{2}°$ below nothing, or more than 30° below the point usually assigned for the congelation of mercury.

We understand that Mr. Leslie, from the commencement of these inquiries, confidently expected to be able to freeze quicksilver by such a process. In January last year, he maintained a cold within a degree of mercurial congelation during the space of eight hours; but his air pump not being then in perfect order, and some other parts of the apparatus being likewise defective, he was induced to defer the experiment for some time.

It is evident that such prodigious powers of refrigeration, and which will no doubt be further improved, open a wide field for philosophical investigation. Liquids which have hitherto resisted congelation may yet be rendered solid, and gases converted into liquids.

[From the London Medical and Physical Journal for July 1812.]

The publication of a second volume of the Transactions of the Medical and Chirurgical Society, shews very distinctly the flourishing state of that body, by the number of articles which it contains, the character of the contributors, and the addition to its members. But, as it is intended to give an analysis of this volume at a future time, nothing more than its prominent features will now be noticed.

In the medical department will be found a case of hydrocephalus internus; a paper on the use of oil of turpentine in tænia; a case of secondary small-pox, to which is appended an historical detail of similar cases, collected from the printed records of medicine; an account of a severe case of erythema, unconnected with mercurial action; on painful affections of the side with tumid spleen; a case of recovery from the effects of a large dose of arsenic; and on the effects of arsenic as a remedy for the bite of venomous snakes. The chirurgical class will be considered as particularly valuable when it is seen that Mr. Astley Cooper, Mr. Travers, Mr. Chevalier, and Dr. Hutchinson, have been contributors. The value of the chemical part is sufficiently characterized by the paper of Dr. Henry on the urine discharged in diabetes mellitus, by Dr. Bostock's experiments and observations on the serum of the blood, and by Dr. Marcet's chemical account of various dropsical fluids. The dissection of a limb, on which the operation for popliteal aneurism had been performed, by Mr. Astley Cooper, and a case of premature puberty in a female by Dr. Wall, are not the least interesting among these papers.

Died—Lately at the island of Madeira, whither he had gone on account of ill health, Robert Willan, M. D. of London.

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

At an Annual Election for Officers, held July 7th, the following persons were duly chosen.

President.

Dr. Adam Kuhn.

Vice-President.

Dr. Samuel Duffield.

Censors.

Dr. Thomas Parke.
Dr. Caspar Wistar.
Dr. Samuel P. Griffitts.
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Secretary.

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An Inquiry into the Nature and Cause of Respiration. 2*s*. 6*d*.

A Treatise on the Diseases of the Eye. By I. Saunders. Royal 8vo. 25*s*. 6*d*. or with the plates coloured, 31*s*. 6*d*.

The second volume of Transactions, published by the Medi- and Chirurgical Society of London. 8vo. 16*s*.

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Report of the Medicinal Effects of an Aluminous Chalybeate Water lately discovered at Sandrocks, in the Parish of Chall in the Isle of Wight, pointing out its Efficacy in the Walcheren and other Diseases incident to Soldiers who have served abroad, and more particularly the Advantages to be derived from its introduction into private Practice. By William Lempriere, M. D. Physician to the Forces at the Army Depot. In one volume, 8vo. 5s. boards.

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An Inaugural Dissertation on the Medical properties of Gold. By John C. Cheeseman, Licentiate of the Medical Society of the state of New-York, and Vice-President of the Philo Medical Society. New-York. Collins and Co. 1812.

Proposed American Publication, by Kimber and Richardson, Philadelphia.

An Inquiry into the Diseases of the Mind By Benjamin Rush, M. D. Professor of the Institutes and Practice of Medicine, in the University of Pennsylvania.

N. B. This work will contain about 400 pages 8vo, and will embrace not only all the different forms of Madness, but the Physical History of the Disease of the Passions, and their respective Remedies.